SERVICE MANUAL
FOR
KODAK "EKTRA"

SEPTEMBER 1943

Repair Service Instructions A-237

September , 1943

SERVICE MANUAL FOR KODAK EKTRA

Disassembly of the Kodak Ektra

1. Remove Lens and Magazine.
   (See Instruction Manual, pages 15 and 17)

2. Remove Range Finder Housing

   A. Remove Speed Setting Knob Screw #72177, using large end of tool #500C, and remove Upper Ratchet for Speed Setting, #78034, and Speed Setting Knob Assembly #78087.

   B. Remove two Range Finder Housing to Case Screws #85381, located underneath top of Case. The old style screw #42929 is a regular screw with slotted head. The late style has two small holes in the head and is removed with tool #500V.

   C. Carefully lift Range Finder Housing Complete #73096, from Case.

3. Remove Shutter Mechanism Plate Assembly #73075.

   A. Wind shutter (if it can be wound) by placing flat end of winding stick (tool #500 II) in slot of gear underneath top of Case (Main Drive Shaft and Ratchet Assembly #87509) and turning counterclockwise as far as possible.

   B. Screw dummy speed setting knob (tool #500H) into top of speed setting shaft. This helps in removing and replacing Mechanism Plate Assembly.

   C. Release shutter by depressing Shutter Release Lever #64841. Be sure the shutter closes fully, and put a small pencil mark on the Mechanism Plate, directly beneath the index line at the "25" on the high speed dial.

   D Remove Release Lever Stud #85387 (old style #64875), disconnect end of Release Lever Spring #85386 (old style spring #72181 comes off with screw) from stud, and lift off Release Lever Assembly #73079, disconnecting left end of Connecting Rod #64877 from Shutter Release Lever #64841.

E. Remove Retard Lever Spring Stud #77947 (the old style has a Retard Lever Spring #77945 on this stud; the late style does not), and the two flat head Mechanism Plate to Case Screws #15259. Carefully lift off the Mechanism Plate Assembly.

4. Remove Range Finder Base Assembly Complete #73091.

A. Remove the two flat head Range Finder Base to Case Screws #58729, and one round head Range Finder Base to Case Screw #79025; then lift range finder from case.

B. When Range Finder is removed from Case, wrap it in tissue paper, or place some kind of a cover over it, to keep prisms and lenses free of dust.

5. Remove Shutter Curtains and Curtain Rollers.

A. Remove Case Shutter Cover to Case Screws (6) #81050 and Case Shutter Cover #65013.

B. Remove Sleeve for Spacing Post #72201 from post.

C. Remove Motor Locking Lever #64833, and Motor Locking Lever Screw #86692 (old style #64849). Keep this lever and screw together, as the screw is fitted to the lever.

D. Remove Trip Lever and Spring Assembly #73080, and Trip Lever Screw #86692 (old style #64849). Keep this lever and screw together, as the screw is fitted to the lever.

E. Remove Delayed Action Assembly to Case Screws (2) #10363, and Delayed Action Gear Train Assembly #73060.

F. Drive Winding Gear Tapered Pin #78038 out of Curtain Winding Gear #64896, and remove gear from end of shaft. Support gear on a small block while driving pin out, so end of shaft will not be bent.

G. Remove Case Lock Screws (2) #55320, and Case Latch Cover #78086 from bottom of Kodak.

H. Remove Lower Bearing Screws (2) #78050, Winding Curtain Assembly Lower Bearing #73063, and Curtain Control Disc #64890, which is on the inner side of the bearing.

I. Remove Upper Bearing Screws (2) #57235, and Winding Curtain Assembly Upper Bearing #78092.

J. Lift the Winding Curtain Roller Shaft Assembly #88472 (old style #73068) out of the case, lower end first. It is the roller at the left end of the Kodak.

On each end of this roller is a narrow, flanged, ribbon roller, to which the ribbons of the wide shutter curtain are cemented. The late style ribbon rollers have a gear on their inner surfaces; the old style ribbon rollers do not.

The late style Roller for Curtain Ribbon Upper Assembly #88473 (see fig. 1), the old style Roller for Curtain Ribbon Upper Assembly #73056, and the late style Roller for Curtain Ribbon Lower Assembly #88474 can be slipped off the end of the Roller Shaft.

The old style Roller for Curtain Ribbon Lower Assembly #73065 is held on the shaft by Ribbon Roller Take-up Spring #77916, which must be disconnected from the small stud on the flange of the roller before the roller can be removed from the shaft.

K. Remove Curtain Shaft Retainer Screw #66892, and Curtain Shaft Retainer #64943, located on bottom of Kodak at right end.

L. Lift out the small Curtain Roller Shaft Bushings (2) #64950.

M. Remove the Curtain Roller Assembly-Short #73062, and the Curtain Roller Assembly-Long #73061, by pulling the shafts down and lifting the upper end out of the case.

The Curtain Roller Spacer-Upper #64949, and Curtain Roller Spacer-Lower #64942, can be slipped off the ends of the short curtain roller.

To remove Curtain Roller Shaft #64939, and Curtain Roller Spring #65068, remove the Curtain Roller Bushing to Roller Screw #55321, the short Curtain Roller Bushing (upper) #72130, and pull Shaft and Spring out of roller.

6. Remove Lens Mount Assembly.

To remove Lens Mount Assembly #73069 remove the Front Lens Stationary Mount to Case Screws (4) #72141, and lift mount from case.

7. Remove Tripod Nut and Lens Lock.

   A. Remove Key to Lens Mount Screw #72140, which is reached through the hole in the Tripod Nut, and the flat Lens Mount Key #68909 which is inside the lens mount.

   B. Remove the Tripod Nut Screws (2) #74112, which will allow the Tripod Nut #78085, the Lens Lock Assembly #73102, and the Lens Lock Spring #68496 to come off.

8. Remove Focusing Knob and Intermediate Focusing Gear.

   A. Remove Lens Focusing Pinion Tapered Pin #61626 from Lens Focusing Pinion #64962, pull Lens Focusing Knob Assembly #73070 out of case, and remove Lens Focusing Pinion.

   B. Remove Intermediate Gear Stud #64968 and Intermediate Lens Focusing Gear #72142.

9. Remove Intermediate Winding Gear and Main Drive Shaft.

   A. Remove Intermediate Winding Gear Screw #59044, Intermediate Gear Assembly #73073, and Main Shaft Ratchet Pawl Spring #72143.

   B. Remove Winding Lever Pawl Screw #86693 and Winding Gear Pawl #64934.

   C. Remove Motor Locking Cam Screw #56561, Motor Locking Cam #64832, and Main Drive Shaft and Ratchet Assembly #87509.

Reassembly of the Kodak Ektra

NOTE: Use supporting block (tool #500-JJ) under back edge of case while working on the top of the Kodak to keep it in an upright position.

1. Reassemble Intermediate Winding Gear and Main Drive Shaft.

   A. Before reassembling Main Drive Shaft and Ratchet Assembly #87509, examine the teeth on the Main Drive Shaft Locking Ratchet #64839 to be sure none of them are broken.

   Fit new Main Drive Shaft Locking Ratchet #64839.

   If any of the teeth on the locking ratchet are broken, slip a thin knife blade under it and pry it off. Fit a new ratchet in place, being sure the teeth are pointed in the same direction as the old one. Turn over the corners of the shoulder a little with a punch to keep it in place.

   B. Fit Main Drive Shaft into case and assemble Motor Locking Cam #64832 to top of shaft with Motor Locking Cam Screw #56561. Be sure it turns freely, with as little end play as possible.

   Fit new Main Drive Shaft and Ratchet Assembly #87509.

   If it is necessary to fit a new Main Drive Shaft, file down the two shoulders on the end of the shaft, to remove as much end play as possible and still have it work freely.

   If necessary, file the end of the shaft so it is a little below the shoulders in the cam, to be sure the cam is seating on the shoulders of the shaft.

   Fit new Motor Locking Cam #64832.

   If it is necessary to fit a new Motor Locking Cam, stone the end surface of the top lug just enough to make it smooth, but DO NOT round off the corner or change the angle.

   C. Reassemble Winding Gear Pawl #64984 to case with Winding Lever Pawl Screw #86693.

D. Place the Main Shaft Ratchet Pawl Spring #72143 over the Intermediate Winding Gear Shaft, with the long end toward the case, and slip the short end down over the edge of the Winding Gear Pawl.

E. Reassemble Intermediate Winding Gear Assembly #73073 and Intermediate Winding Gear Screw #59044 to Intermediate Winding Gear Shaft #65014.

2. Reassemble Focusing Knob and Intermediate Focusing Gear.

A. Reassemble Intermediate Lens Focusing Gear #72142 and Intermediate Lens Focusing Gear Stud #64968.

B. Slide Lens Focusing Pinion #64962 into place in case, insert Lens Focusing Knob Assembly #73070 through case and into pinion, line up taper pin holes, and drive Lens Focusing Pinion Tapered Pin #61626 in tight.

3. Reassemble Tripod Nut and Lens Lock.

A. Place Lens Lock Spring #68496 on the Tripod Nut #78085 with the long formed end in the small hole, and the curved part of the spring around the screw hole. Place the Lens Lock Assembly #73102 in position over the spring, place the Lens Mount Assembly #73069 down on the Tripod Nut, and put the Tripod Nut Screws (2) #74112 in place. Do not screw them in all the way.

B. Turn Lens Mount face up, push Tripod Nut out away from Lens Mount a little; now, using tool #500 HH, catch the short turned-up end of the Lens Lock Spring in the notch in the end of the tool, and push the spring down between the Lens Lock and the Tripod Nut until it drops in behind the Lens Lock. Pull the tool out and tighten Tripod Nut Screws as tight as possible. Be sure Lens Lock works freely.

C. Reassemble Lens Mount Key #68909 to mount, rounded corners out, with the Key to Lens Mount Screw #72140.

D. A small amount of thick shellac placed in the clearance holes in the back of the Lens Mount Key will help to keep the Tripod Nut Screws from working loose.

4. Reassemble Lens Mount Assembly.

Reassemble Lens Mount Assembly #73069 with Front Lens Stationary Mount to Case Screws (4) #72141 and screw them down tight.

5. Reassemble Long and Short Curtain Rollers.

Note: For all oiling purposes on the Kodak Ektra and Magazine use Aircraft Instrument Oil.

A. Put a small drop of oil on each end of the shaft. Reassemble the Curtain Roller Assembly-Long #73061 by pushing the shaft toward the lower end of the roller, inserting the end of the shaft through the small bushing hole nearest the front at the bottom of the case. Drop the upper end into the case, and move it around until the upper end of the shaft enters the front hole in the top of the case.

B. Put a small drop of oil on each end of the shaft, and on each end of the Curtain Roller Assembly-Short #73062. Reassemble Curtain Roller Spacer-Upper (short) #64949 to upper end of curtain roller and Curtain Roller Spacer-Lower (long) #64942 to lower end, with the shoulder ends toward the outside. Reassemble the roller in the rear upper and lower curtain shaft holes in the case -- same procedure as in the preceding paragraph.

C. Place small Curtain Roller Shaft Bushings (2) #64950 over the ends of the shafts and press them down into the case.

D. Reassemble Curtain Shaft Retainer #64943 with the Curtain Shaft Retainer Screw #66892; be sure it has enough tension to stay in the ends of the curtain roller shafts. This is important.

6. Reassemble Winding Curtain Roller Shaft Assembly.

When the shutter is released, the curtains will run across the aperture in the case from left to right, and must stop a short distance to the right of the aperture.

The curtains are stopped by the Curtain Control Discs, the stop pins in the Winding Curtain Roller Shaft Assembly #88472, and the upper and lower curtain roller bearings.

When the Winding Curtain Roller Shaft Assembly stops, the winding curtain roller should have three-quarters of a turn of the narrow shutter curtain left on it, and the ribbon rollers should have approximately one-half a turn of the ribbons left on them.

It is very important that the winding curtain roller, the upper and lower ribbon rollers, and the curtain control discs stop in the proper relation to each other, in order to stop the rollers and curtains in the correct position.

When the winding curtain roller shaft assembly and bearings are properly assembled to the case, the lower bearing is held rigid in the case by its screws. The stop pin G (figure 1) stops the lug H on the curtain control disc above it, against which the stop pin I in the lower side of the lower ribbon roller stops, thus stopping the lower ribbon roller. The stop pin B, in the upper side of the lower ribbon roller, stops the lug C of the curtain control disc above it, against which the lug A stops on the curtain control disc stop, thus stopping the winding curtain roller shaft. The upper curtain roller bearing is also held rigid in the case by the upper bearing screws. The stop pin F in the bearing stops the lug E on the curtain control disc below it, against which the stop pin D in the upper side of the upper ribbon roller stops, thus stopping the ribbon roller.

The late style Ektra has a small Idler Shaft #87587 between the Winding Curtain Roller Shaft Assembly and the front of the case. Be sure this turns freely and has a very small amount of end play. It can be adjusted for end play and position by adjusting the upper and lower Idler Shaft Pivot Screws #87588. After adjusting these screws, a drop of Vulcolac or Shellac on the heads will keep them from working loose.

A. Late Style Winding Curtain Roller Shaft Assembly.

1.) When reassembling the late style Winding turtain Roller Shaft Assembly and bearings to the case, place the Kodak face down with the right end directly toward you. Hold the Winding Curtain Roller with the Winding Curtain Clamp #68873 toward you; give it one complete turn counterclockwise, so there is three-quarters of a turn of the narrow curtain on the roller, with the curtain coming off the top of the roller toward the right end of the Kodak. In this position the stopping lug A (see fig. 1) of the Curtain Control Disc Stop #77930 will be near the top on the side toward you.

2.) With the upper side of the Roller for Curtain Ribbon Lower Assembly #88474 to the right, and the stop pin B in the upper side directly toward you, put a small drop of oil on the hub; put the Control Disc for Second Curtain #86701 (the thin one) on the hub, flat side in, with the stopping lug C above the stop pin B. Oil the projecting end of the curtain roller shaft, and slip the ribbon roller on the roller shaft with half a turn of the ribbon on the roller. The stopping lug C on the curtain control disc must be between the stop pin B and the stopping lug A on the Curtain Control Disc Stop.

3.) Put a small drop of oil on the upper end of the roller shaft, and slip the Roller for Curtain Ribbon Upper Assembly #88473 on the shaft. Lift the free end of the Speed Curtain Pawl #64905 out away from the shaft, slide the ribbon roller down, let the pawl drop into the ratchet on the ribbon roller, and turn the roller until there is approximately half a turn of the ribbon on it.

4.) Turn the Speed Throw-out Lever #64830 up against the spring on the inside of the case until it points down toward the front of the case, and hold it there. Insert the upper end of the roller shaft through the case; then drop the lower end into place, with the gears of the ribbon rollers meshed into the gears on the idler shaft.

5.) Turn the Kodak upright and turn the upper ribbon roller so the stop pin D is toward the back of the case. Put a small drop of oil on the hub in the roller, and drop the Curtain Control Disc into the roller, flat side down, with the stop lug E to the right of the stop pin D. Put the upper bearing on the shaft and slide it down into the case, with the stop pin F directly toward the right end of the case, and the stopping lug E on the curtain control disc between the stop pins D and F; then put the Upper Bearing Screws #57235 in place.

6.) Hold the lower bearing with the upper side to the right, and the stop pin G directly away from you. Oil the hub. Put the curtain control disc on the hub with the flat side away from the bearing, and the stopping lug H beneath the stop pin G. Put the bearing into the case so the stop pin I in the lower side of the lower ribbon roller is below the lug H on the control disc. This brings the lug H between stop pins G and I.

7.) The upper and lower ribbon rollers must be meshed into the idler shaft in exactly the same position.

To check meshing of ribbon rollers -- after the lower bearing is in place, turn it counterclockwise until the whole roller assembly begins to turn. This brings the stops and stop pins together. Then turn the upper ribbon roller clockwise, allowing the lower bearing to turn with it, until it stops. If the ribbon rollers are lined up properly on the idler shaft, the notches in the lower bearing will be in line with the screw holes in the case, and the stop pin G will be toward the left of the case.

8.) If the lower bearing is not in line with the upper bearing, it will have more or less than half a turn of the ribbon on it. In this case remove the bearing, and roll the lower end of the winding roller assembly to the right or left, whichever is necessary. Then lift the lower ribbon roller gear out of the idler shaft gear, move it in the

opposite direction one or two teeth, and drop it into the idler shaft gear again.

Put the bearing back in place properly, and check the position of the lower bearing and roller the same as before. Repeat, if necessary, until the notches in the bearing line up perfectly with the holes in the case, and the lower ribbon is the same length as the upper one. Put the lower Bearing Screws #78050 in place.

B. Old Style Winding Curtain Roller Shaft Assembly.

1.) To reassemble the old style Winding Curtain Roller Shaft Assembly #73068, place the Kodak face down with the right end toward you. Hold the winding curtain roller shaft assembly with the Winding Curtain Clamp #68373 directly toward you. Give it one complete turn counterclockwise so there is three-quarters of a turn of the narrow curtain on the roller, with the curtain coming off the top of the roller toward the right end of the Kodak. In this position the stopping lug A (see fig. 1) of the Curtain Control Disc Stop #77930 will be near the bottom on the side away from you.

2.) With the upper side of the lower ribbon roller to the right and the stop pin B in the upper side of the roller away from you, oil the hub in the roller and put the Curtain Control Disc #64890 on the hub, flat side in, and with the stopping lug C below the stop pin B. Oil the projecting end of the roller shaft, and slip the lower ribbon roller on the end of the shaft, so the stopping lug C on the curtain control disc is between the stop pin B and the stopping lug A, with approximately half a turn of the ribbon on the roller.

3.) With a small hook, catch the loop in the end of the Ribbon Roller Take-up Spring #77916; pull it up to the stud in the flange of the ribbon roller; give it one full turn more, and hook it over the stud. This should give the take-up spring approximately one and one-quarter turns.

4.) Put a small drop of oil on the upper end of the roller shaft and slip the Curtain Ribbon Upper Assembly Roller #73056 on the shaft. Lift the free end of the Speed Curtain Pawl #64905 out away from the shaft, slide the ribbon roller down, let the pawl drop into the ratchet on the ribbon roller, and turn the roller until there is approximately half a turn of the ribbon on it.

5.) Turn the Speed Throwout Lever #64830 up against the spring on the inside of the case until it points down toward the front of the case. Hold it there. Insert the upper end of the roller shaft through the case, and drop the lower end into place.

6.) Turn the Kodak upright, and turn the upper ribbon roller so the stop pin D is toward the back of the case. Oil the hub in the ribbon roller, and drop the Curtain Control Disc #64890 into the roller, flat side down, with the stopping lug E to the right of the stop pin D. Put the upper bearing on the shaft; slide it down into the case with the stop pin F directly toward you, and the stopping lug E on the Curtain Control Disc between the stop pins D and F. Then put the Upper Bearing Screws #57235 in place.

7.) Hold the lower bearing with the upper side to the right, and the stop pin G toward you. Oil the hub; put the Curtain Control Disc on the hub, flat side away from the bearing, with the stopping lug H above the stop pin G. Turn the bearing clockwise until the stop pin is down toward the front of the case; put the bearing into the case, so the stopping lug H on the curtain control disc is between the stop pin I in the lower side of the lower ribbon roller and the stop pin G in the lower bearing; turn the bearing counterclockwise until the notches line up with the screw holes in the case, and the stop pin G is directly toward the right end of the Kodak. Then put the Lower Bearing Screws #73050 into place.

7. Preliminary Setting of Curtain Tension.

Back the Curtain Shaft Retainer Screw #66892 off about half a turn, and lift the

ends of the Curtain Shaft Retainer #64943 out of the ends of the curtain roller shafts.

Turn the shaft of the narrow curtain clockwise until the slack is out of the curtain; then give it one full turn more on the old style Kodak (without the idler shaft), or two and a half full turns on the late style Kodak.

Turn the shaft of the wide curtain clockwise until the slack is out of the curtain; then give it two full turns more on the old style Kodak, or three and a quarter full turns on the late style Kodak.

(This is a preliminary setting only, and must be readjusted later when adjusting the shutter speeds.)

8. Reassemble Curtain Winding Gear.

Reassemble Curtain Winding Gear #64896 to the end of the Winding Curtain Roller Shaft; turn it on the shaft until the marks on the gear and the shaft line up, and insert the Winding Gear Tapered Pin #78038. Be sure it is tight.

9. Reassemble Delayed Action Gear Train Assembly.

Reassemble the Delayed Action Gear Train Assembly #73060 with the Delayed Action Assembly to Case Screws (2) #10363.

10. Reassemble Trip Lever and Spring Assembly.

Reassemble the Trip Lever and Spring Assembly #73080 with the Trip Lever Screw #86692 (old style #64849). Be sure the lever works freely with as little up and down play as possible. If the screw is too tight and the lever binds, mill a little stock off the under side of the head of this stud, using Tool #500-N. If there is too much up and down play, mill a little stock off the bottom of the shoulder of the stud. It is very important that this lever neither binds nor has too much up and down play. Hook the free end of the Counter Operating Lever Assembly Spring #78039 over the head of the Counter Operating Lever Spring Stud #77925.

11. Reassemble Motor Locking Lever.

Reassemble the Motor Locking Lever #64833 with the Motor Locking Lever Screw #86692 (old style #64849). Be sure this lever works freely with no up and down play. If it binds or has too much up and down play, refit the screw using Tool #500 N. If there is up and down play in this lever, the end will drop down and catch in the mechanism when the Kodak is held upside down.

12. Check Shutter Locking Lever for Motor.

The Shutter Locking Lever for Motor #68284 should work freely on the Shutter Locking Lever Screw #86692 (old style #64849), with very little up and down play.

Swing the Motor Locking Lever #64833 in against the cam in front of the second point on the bottom edge of the Motor Locking Cam #64832, and turn the main drive shaft and cam tight against it. The Shutter Locking Lever should be just short enough to swing in, in front of the first point on the bottom edge of the cam, and long enough to prevent the drive shaft and cam from turning when the Motor Locking Lever is swung out away from the cam. If it is too long and will not drop in front of the cam point, file the locking point back a little, being careful not to change the angle of the point. If it is too short and allows the main drive shaft and cam to turn when the Motor Locking Lever is swung out, swedge the locking point out a little.

When either one of these levers is in against the cam in front of its proper point on the cam, and with the main drive shaft and cam held tight against it, the other one should move in and out freely. DO NOT alter the Motor Locking Lever. Do all adjusting on the Shutter Locking Lever. This is important.

13. Reassemble Spacing Post Sleeve.

Reassemble the Sleeve for Spacing Post #72201 to the Spacing Post #64838.

14. Reassemble Range Finder Base Assembly Complete.

Reassemble the Range Finder Base Assembly #73091 to the case with the three Range Finder

Base to Case Screws. Use two flat head screws #58729 and one round head screw #79025 on the late model, or three round head screws #79025 on the old style.

15. Reassemble Shutter Mechanism Plate Assembly #73075.

A. To reassemble the Shutter Mechanism Plate Assembly the High Speed Dial must be set at "25." Hold the Shutter Mechanism Plate with the top side up, and the end of the plate with the two screw holes in it to the left. Turn the Speed Setting Shaft Assembly #78088 until the Shutter Lock Stud #64825 (see Fig. 3) which projects down from the black Shutter Lock Stud Assembly #73076 on the under side of the shutter drive disc, is directly toward you. In this position the "25" on the dial should point toward the screw hole in the front left corner of the mechanism plate. If it does not, it is not set at "25."

B. To set it at "25" hold the shutter drive disc with the shutter lock stud directly toward you; lift the speed setting shaft by pulling up on the dummy speed setting knob (Tool #500 H), which is in the top of the shaft; hold it up, and turn it until the "25" is toward the front left corner; let it drop, and turn it a little one way or the other until it drops in the slot in the curtain lock plate, so that it can not be turned without turning the shutter drive disc.

C. Be sure the trip lever is over to the right as far as it will go. Hold the mechanism plate in the position described above, with the shutter lock directly toward you. Swing the Shutter Release Lever #64841 up, set the mechanism plate down on the top of the Kodak, and mesh the Curtain Intermediate Gear-Large #77932 (see Fig. 3) (on the underside of the mechanism) into the Curtain Winding Gear #64896 on the end of the winding curtain roller shaft.

D. When the mechanism is in place there should be approximately .025" clearance between the Shutter Lock Stud and the left end of the trip lever, when the mechanism and winding curtain roller are fully unwound. When the shutter mechanism is fully wound, there should

be a little play in the trip lever, between the Shutter Lock Stud and the end of its travel to the left.

Note: The clearance between the Shutter Lock Stud and the left end of the Trip Lever will vary, but there should never be less than .004" or .005" clearance at this point. The stud should never touch the end of the trip lever when the shutter is fully unwound. This is important.

E. If the Mechanism Plate has been assembled properly, the index mark at "25" will be directly over the pencil mark which was put on the mechanism plate before it was removed. If it is not in line with the pencil mark, raise the mechanism plate until the intermediate gear is out of the curtain winding gear; then turn the Speed Setting Shaft one or two teeth to the right or left, as needed, and lower mechanism plate into place. If no pencil mark has been put on the mechanism plate, set the mechanism as stated in "C" above and proceed with the rest of the reassembly. The proper setting can be checked and reset later if necessary.

F. When the shutter mechanism is lined up properly, assemble the 2 flat head Mechanism Plate to Case Screws #15259, and the Retard Lever Spring Stud #77947, which goes in the rear left corner of the plate. (The old style Retard Lever Spring Stud has a Retard Lever Spring #77945; hook its free end over the Retard Lever #73081.)

16. Reassemble Release Lever Assembly.

A. Hook the U shaped end of the Connecting Rod for Release #64877 into the end of the Release Lever Assembly #73079; insert the other end of the connecting rod into the small hole in the Shutter Release Lever #64841; assemble the Release Lever Assembly to the mechanism plate, with the long stud on the under side of the release lever through the large hole in the mechanism plate, and assemble the Release Lever Stud #85387 (old style #64875).

Fit the Release Lever Stud if necessary, using Tool #500 N, so the Release Lever works freely, and has very little up and down play.

B. Hook the end of Release Lever Spring #85386 over the spring stud in the release lever. The old style Release Lever Spring #72181 fits over the release lever stud, and hooks on the mechanism plate near the stud and in the notch in the side of the pallet bracket.

C. Be sure the release lever works freely enough, so it returns all the way, after releasing the shutter. This is important. If it does not return all the way, it will be impossible to wind the shutter.

D. After the release is fitted, start to wind the shutter mechanism very slowly. Listen for the first click of the winding gear pawl on the teeth of the main drive shaft ratchet, and at the same time watch the shutter curtains. There must be ONE and ONLY ONE CLICK of the pawl before the curtains start to move. The curtains MUST start to move between the FIRST and SECOND click of the pawl, when the high speed dial is set at "25."

Note: If no mark was put on the shutter Mechanism Plate before it was removed, the proper setting can be checked now. Wind the shutter and lift the Speed Setting Shaft by pulling up the dummy speed setting knob. Turn it counterclockwise as far as it will go, let it down, and turn it clockwise until it drops. It is now set for 1/1000. Check the curtain opening. If it is approximately .030" the mechanism is set properly. If there is no opening, or if the opening is 1/8" wide or more, set the high speed dial back to "25." Remove the Release Lever Assembly and the Mechanism Plate to Case Screws, and reset the mechanism (see "15, E").

17. Adjusting Release Lever.

A. Wind the shutter and pull the Shutter Release Lever #64841 down slowly. The end of the Shutter Lock Stud Assembly #73076 should meet the releasing lug on the release lever well toward the front end. As the Shutter Release Lever is pulled down the Shutter lock should travel forward on the lug, and release the shutter just before it reaches the forward corner of the lug. If the lug on the release lever is back too far it will not release the shutter. In this case bend it forward a little. If it is too far forward, it will release

the shutter before it is fully wound. In this case bend it back a little. The lug on the release lever should be in such a position that it will release the shutter easily, but not release it until it is fully wound.

If the shutter can be released before it is fully wound, the proper amount of film will not be transported and the frames will overlap. Wind the shutter fully; put a pencil mark on one of the teeth of the main drive shaft, and on the case at the same tooth; and release the shutter. Now wind the shutter about seven-eights. Finish the wind slowly. At each click of the Winding Gear Pawl #64984 on the Main Drive Shaft and Ratchet Assembly #87509, pull the release lever down to see that it does not release the shutter until the marked tooth is up to the mark on the case.

B. Wind the shutter and pull the Shutter Release Lever down slowly until the shutter releases. See that it still has a little distance to travel after the shutter is released, to be sure the shutter is not releasing just at the end of the shutter release lever's travel, as this may cause failure to release at times. If there is no extra travel, back off the Shutter Release Lever Adjusting Screw #72183 a little.

C. When the shutter is released and the Shutter Release Lever held down, the end of the shutter lock will strike the lug on the release lever lightly when the shutter closes; but it should not strike it hard enough to slow up the curtains, or prevent them from closing all the way. If it does strike too hard, the Shutter Release Lever has too much travel after the shutter releases. In this case, screw up the Shutter Release Lever Adjusting Screw a little.

D. After the Shutter Release Lever Adjusting Screw is properly adjusted, tighten the Set Screw #72184.

E. The shutter must release easily. If it tends to bind, or hangs, it will cause camera movement. If the shutter release lever's travel is not adjusted properly, it may cause the shutter to release hard. If the Winding Gear Pawl is not adjusted properly, it may cause the shutter to release hard.

When the Main Drive Shaft comes up to a full wind, the Winding Gear Pawl #64984 should drop into the last tooth without having to force the Main Drive Shaft. The Main Drive Shaft should drop back .002" or .003" when the winding pressure is released. If it locks tight, it will lock the locking cam tight against the shutter lock, making it very difficult to release the shutter. If it does this, remove the Winding Gear Pawl and file a little off the end, being careful not to change the angle.

If the Main Drive Shaft drops back more than .002" or .003" increase the length of the pawl by swedging. If it drops back too much it will cause trouble with the 1/1000 speed adjustment.

If the angle of the releasing lug on the release lever is not correct, it may cause the shutter to release hard. The left side of the lug, which contacts the shutter lock, should be at a slight angle from a line drawn directly across the case from front to back, with the rear end of the lug to the left of the front end. If the angle is too little the shutter will release hard. Twist the lug a little to increase the angle. If the angle is too great, or if the front corner is filed off to a greater angle, the shutter will release quite easily, but it may be necessary to pull the lever so far to the left to release the shutter that the shutter lock will strike the back end of the lug and keep the shutter from closing properly.

If the left side of the lug is not straight and smooth, it will cause the shutter to release hard. File it straight, polish with fine emery cloth, and burnish.

A little vaseline or light grease on the edge of the lug will help to make the shutter release easily.

18. Adjusting Speed Throwout Lever Release.

A. When the shutter is released, the wide curtain must release just before the narrow curtain releases. There is a notch cut in the flange of the upper ribbon roller. When the shutter is fully wound, the Speed Curtain Release #64904 (the black lever inside the case) drops into

this notch and keeps the wide curtain from releasing. When the shutter is released, the pin in the under side of the release lever strikes the Speed Throwout Lever #64830, throwing the Speed Curtain Release out of the notch, and releasing the wide curtain. With the shutter wound, pull the shutter release lever down until the releasing lug on the release lever just contacts the end of the shutter lock. By pulling the shutter release lever down slowly, you will notice that the release lever travels to the left approximately 1/32" from the point of contact to the point of release. The wide curtain must release somewhere between these two points.

B. To check the point at which the wide curtain releases, wind the shutter, pull the shutter release down until it just makes contact with the shutter lock, and hold it there. Grasp the flange of the upper ribbon roller with a pair of tweezers, and pull it toward the right end of the Kodak. If it turns, it is already released, and is releasing too soon. Remove the release lever, and bend the pin on the under side back a little from the speed throwout lever. Re-assemble the release lever and recheck. If the ribbon roller is not released when the release lever contacts the shutter lock, pull the release lever down slowly, and keep pulling the ribbon roller intermittently until the roller releases (by keeping a steady pull on it, the speed throwout lever cannot release).

C. If you have moved the release lever a short distance from its point of contact, when the ribbon roller releases, and can still move it a little farther before the narrow curtain releases, the adjustment is right. If the wide curtain has not released when the narrow curtain releases, it is releasing too late. To make it release earlier, remove the release lever and bend pin forward a little toward the speed throwout lever.

If the wide curtain releases before the release lever contacts the shutter lock, the shutter is likely to open when changing the speed from 1/25 to a higher speed, causing fogged film.

If the wide curtain does not release until after the narrow curtain releases, there will be no opening as the curtains pass the aperture, and no exposure.

19. Adjusting Delayed Action Release.

A. Wind the Delayed Action, using Tool #500 G -- insert the two teeth of the tool into the small delayed action winding gear at the rear right corner of the mechanism plate, and turn it counterclockwise as far as it will go. The Delayed Action Release #64878 should ride up on the Delayed Action Locking Cam #64876 freely, and drop down into the slot in the cam. If the delayed action winding gear does not turn far enough to allow the delayed action release to drop, file a little off the side of the cam stopping lug, until the release drops into the slot freely. Release the delayed action by depressing the shutter release lever, and time it to see how long it runs.

B. It should release the shutter when the end of the cam has reached the BACK edge of the delayed action release; and it should run from eight to fourteen seconds before releasing the shutter. If it runs more than fourteen or less than eight seconds before releasing the shutter, adjust it by turning the eccentric Delayed Action Release Adjustment Stud #72185, at the back end of the release lever, to the right or left until the shutter releases within these limits.

C. If the delayed action cannot be adjusted to release the shutter between eight and fourteen seconds by adjusting the eccentric adjusting stud, bend the releasing lug arm on the release lever to the right or left a little, and recheck for length of running time.

NOTE: If it is necessary to bend the release lever arm in adjusting the delayed action release, check and readjust, if necessary, the shutter for releasing easily, the shutter lock for striking the lever, the shutter release for clearance (see No. 17, B and C), and the wide curtain for releasing before the narrow curtain (see No. 18).

20. Reassemble Range Finder Housing.

A. To reassemble the Range Finder Housing Complete #73096, set the Speed Dial Plate Assembly #78083 at "25", the Retard Setting Knob #78029 at "B", and the Eye Piece Focus Lever Knob #64936 at "3" minus. The Kodak should be face down with the top away from you.

Hold the Range Finder Housing front side down, with the top away from you, and be sure the Bulb Lever Assembly #78089 is down against the front of the housing. Hold the Delayed Action Winding Lever Assembly #73095 so the end of it is at the back edge of the housing. Put the housing on the case, meshing the Delayed Action Winding Gear in the housing, with the winding gear on the mechanism plate. Hold the housing down lightly, wind the shutter and release it. The shutter will open, but it will not close.

B. Hold the right end of the housing down, and lift the left end away from the housing a little, until the shutter curtains start to move; then bring it down to the case. This is necessary, because the bulb lever stud on the under side of the Retard Setting Knob comes down on top of the Retard Lever Assembly #73081, preventing it from moving when the shutter is released. The bulb lever stud must be down in back of the retard lever in order to set the retard speeds.

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When the left end of the housing is lifted away from the case, the retard lever starts to move toward the front of the Kodak, and the housing can be brought down to the case with the bulb lever stud behind the retard lever.

C. Assemble the two Range Finder Housing to Case Screws #85381 (old style #42929).

21. Reassemble Case Shutter Cover.

Reassemble the Case Shutter Cover #65013 to the case with the Case Shutter Cover to Case Screws (6) #81050.

22. Reassemble Speed Setting Knob.

Put the Speed Setting Knob Assembly #78087 over the speed setting shaft. Fit the Upper

Ratchet for Speed Setting #78034 on top of the speed setting shaft, and assemble the Speed Setting Knob Screw #72177. Be sure the Speed Setting Knob does not bind.

23. Adjustment of Shutter Speeds.

(See Figure 15 for shutter speed tolerance chart.)

NOTE: It is necessary to have the range finder housing on the Kodak in order to check the shutter speeds. The curtain roller spring adjustment for 1/25, 1/1000, and 1 second can be made with the housing on the Kodak. For all other speeds it will be necessary to remove the housing, make the adjustment, replace the housing, and check the speeds.

A. Check and Adjust Curtain Opening.

1.) Remove the range finder housing and screw the dummy speed setting knob (Tool #500 H) into the top of the speed setting shaft. The width of the opening or slit between the curtains must be measured when the slit is at the left edge of the aperture in the case.

2.) To check the width of the slit, wind the shutter, set it on 1/1000, and hold the dummy speed setting knob so it and the shutter mechanism cannot turn when the shutter release lever is pulled down. Pull the shutter release lever down and hold it. Holding the dummy speed knob, let it turn counterclockwise slowly until the slit is at the left edge of the aperture. At this point the distance between the two curtains should be not less than .028" nor more than .030". It is very important that the dummy speed knob be held so that neither curtain moves when the shutter release lever is pulled down. If they do, you will not get the correct opening.

3.) You will notice that as the curtains go across the aperture slowly, the slit gradually becomes wider. This compensates for the increased acceleration of the curtains as they travel across the aperture. The wider opening offsets the increased curtain speed, giving an even exposure over the whole length of the picture.

NOTE: It is very important that the width of the slit between the curtains be kept within these limits. If the opening is too wide or too narrow it will affect the illumination of all pictures taken at 1/1000 of a second, causing them to be streaky or uneven.

4.) If the slit is too narrow (less than .028"), release the shutter and grasp the ribbon end of the narrow curtain. Pull it to the left as far as it will come, put a small wedge between the curtain roller and the case so it will not go back, and turn the winding curtain roller shaft until the curtain anchor strip is up. Put a narrow strip of very thin adhesive tape (such as Scotch tape) across the roller from top to bottom, next to the left edge of the anchor strip. This will enlarge the diameter of the roller, and make it wind up a little more of the curtain, increasing the width of the slit.

Remove the wedge from the curtain roller and let the curtain roll back slowly, being sure the ribbons roll onto the roller evenly. Recheck the slit and if it is not right, put a wider or narrower strip of tape on the roller. Usually a strip of tape from 1/32" to 3/32" wide will be enough. DO NOT use a strip more than 1/4" wide and DO NOT use tape that is more than .005" thick. If the tape is too wide or too thick, or if there is a bump of any kind on the roller, the curtain will not come off the roller evenly, and will result in light and dark streaks in the illumination at 1/1000 of a second.

5.) If the slit is too wide, (more than .030") it is sometimes possible to close it a little by loosening the curtain anchor strip screws slightly, and pulling the curtain to the right a very small amount. It is possible to make only a very small adjustment in this way, because, if the curtain is pulled out too far, there will not be enough left under the anchor strip to hold it. After operating the shutter several times it will pull out farther, closing the slit, and may possibly pull out completely.

6.) DO NOT put any tape on the ribbon rollers, under the wide curtain ribbons. This would narrow the slit, but it will also cause streaky film. If the slit is too wide or too narrow to adjust in the above manner, it will be necessary to pull the two ribbons off the ribbon rollers. Clean the cement from the rollers and the ends of the ribbons, and recement and adjust them as in Sec. 24; C, D, and G; 3, 5, 6, 7, and 8.

B. Adjust 1/25 Second.

1.) It is necessary to adjust the 1/25 second first, because the only way to adjust this speed is with the curtain roller tension springs. If it is necessary to make any adjustment to this speed, all other speeds are affected. The 1/25 is adjusted with the curtain roller tension springs, by increasing or decreasing the tension of one or the other, or both of these springs.

2.) To increase or decrease the tension of the curtain roller springs, back off the Curtain Shaft Retainer Screw #66892 a little, lift the ends of the Curtain Shaft Retainer #64943 out of the slots in the ends of the curtain shafts, and turn the shafts to the right or left 1/4 or 1/2 a turn. Replace the retainer in the end of the shafts, until the 1/25 is within the tolerance limit, see Fig. 15.

3.) There must be enough tension on the curtain roller springs at all times to close the narrow curtain on 1 second and "B", and to snap the wide curtain all the way across the aperture on "B".

C. Adjust 1/1000 Second.

1.) Check 1/1000 speed, and if it is off, it can be adjusted by a little additional adjustment to the curtain roller springs. Increasing the tension of the narrow curtain speeds up the 1/1000, as it makes the narrow curtain follow the wide curtain a little faster, therefore, giving a shorter exposure. Decreasing the tension of the narrow curtain will slow down the 1/1000.

2.) Increasing the tension of the wide curtain slows down the 1/1000, because it makes the

wide curtain pull away from the narrow curtain a little faster, therefore, giving a longer exposure. Decreasing the tension of the wide curtain will speed up the 1/1000.

3.) Usually 1/4 or 1/2 a turn, one way or the other, will bring the 1/1000 within the required tolerance limits, and as a rule will not affect the 1/25. However, it is best to check the 1/25 after 1/1000 is right. Readjust if necessary, until both speeds are right.

4.) Recheck the curtain opening, because increasing or decreasing the curtain roller tension has a tendency to affect the width of the opening. Increased tension on the narrow curtain tends to narrow the slit, while increased tension on the wide curtain tends to widen the slit, and vice versa.

D. Adjust 1 Second.

1.) This speed can be partly adjusted with the curtain roller springs, by increasing or decreasing the tension of one or both of them a little, being careful not to throw 1/25 and 1/1000 out.

2.) Increasing the tension of the narrow curtain will speed up 1 second and possibly some of the other retard speeds (1/2, 1/5, and 1/10), but it may make the 1/25 and 1/1000 too fast. Decreasing the tension will slow down 1 second and possibly the other retard speeds, but it may make the 1/25 and 1/1000 too slow.

3.) Increasing the tension of the wide curtain will speed up 1 second, but it will tend to slow down 1/25 and 1/1000. Decreasing the tension will slow down 1 second, but will tend to speed up 1/25 and 1/1000.

4.) One second can also be partly adjusted by increasing or decreasing the tension of the Back Lash Take-up Spring #83493, located above the Pallet Bracket on the Mechanism Plate Assembly (and the Retard Lever Spring #77945 on the old style). More or less tension on these springs will affect the other retard speeds also. Changing the tension of the Back Lash Take-up Spring will affect all of the retard speeds (1 sec., 1/2, 1/5, and 1/10), but it will affect 1

sec. more than 1/2, 1/2 more than 1/5, and 1/5 more than 1/10. Changing the tension of the retard lever spring, by stretching it out a little to make it weaker, or cutting off a coil or two to make it stronger, will affect 1 sec. and 1/2 most, affecting 1 sec. more than 1/2.

5.) To increase the tension of the Back Lash Take-up Spring, pull the retard lever out slowly until it is out all the way. At the same time hold a finger lightly on the Back Lash Take-up Gear Assembly #83494 (see Fig. 2), so it will not run back when the retard lever is unmeshed. Turn the Back Lash Take-up Gear about 1/4 of a turn counterclockwise to increase the tension, or clockwise to decrease it, and push the retard lever back in.

NOTE: On the old style Kodak which has the Retard Lever Spring, DO NOT remove all the tension from the Back Lash Spring. This spring must have a little tension on it at all times.

On the late style Kodak which has no Retard Lever Spring, the Back Lash Take-up Spring must have enough tension to return the retard lever all the way back to the stop lug on the mechanism plate. After 1/25, 1/1000, and 1 second are properly adjusted, check all of the retard speeds and adjust where necessary.

E. The high speeds (1/25, 1/50, 1/100, 1/250, 1/500, and 1/1000) are controlled, once the curtain roller tension springs and the curtain opening are adjusted properly, by the width of the curtain opening. This varies from .030" at 1/1000 to an opening a little wider than the aperture in the case, at 1/25.

1.) The retard or slow speeds (1 sec., 1/2, 1/5, and 1/10) are controlled by the length of time the narrow curtain is held back, after the wide curtain has run across the aperture. The narrow curtain is held back by the retarding action of the retard lever, and the retarding gear train. When the shutter is released while set for a high speed, the speed setting shaft immediately turns counterclockwise almost a full turn, allowing both curtains to snap across the aperture.

When the shutter is released while set for a retard speed, the wide curtain snaps across the aperture, but the speed setting shaft turns only about 1/3 of a turn. The retard operating stud #77949 in the high speed dial strikes the retard lever dog #65171 (see Fig. 14). The pressure of the mechanism against the side of the dog forces the left end of the retard lever out away from the mechanism, against the retarding action of the retarding gear train, until it is out far enough to let the retard operating stud past the end of the dog, allowing the narrow curtain to close.

2.) The distance that the mechanism has to force the retard lever against the retarding action of the gear train determines the length of the exposure. When the left end of the retard lever is all the way in toward the mechanism, the retard operating stud strikes the dog about 1/8" from the back end, taking a relatively long time to force it out against the gear train. If the left end of the retard lever is pushed part way out, away from the mechanism, the stud will strike the dog farther back toward the end, and take a shorter time to force the retard lever through the gear train, giving a shorter exposure.

3.) When the Range Finder Housing is on the Kodak, the Bulb Lever Stud #78033 (see Fig. 10) performs the function of pushing the retard lever out, or allowing it to come in, to the proper position for the different retard speeds. The bulb lever stud is in the Bulb Lever Assembly #78089, which is assembled to the under side of the retard speed setting knob.

When the retard knob is moved from "B" to "25", the bulb lever stud, which is behind the retard lever, moves through an arc of about 90 degrees, pushing the retard lever out away from the mechanism. When the retard knob is moved from "25" to "B", the stud moves back, allowing the retard lever to move back toward the mechanism.

4.) In adjusting the retard speeds, it is necessary to adjust the retard lever so it will come back to the proper position to

give it the required run through the retard gear train for the speed selected. Also, it is necessary to remove the range finder housing to make the adjustments, and replace it to check the speeds.

5.) It is possible to see how the bulb lever stud operates the retard lever, and where the stud strikes the retard lever for the different speeds. Remove the range finder assembly from the case, and the left range finder window from the housing; then put the housing on the Kodak, turn it upside down, and look through the window opening. The bulb lever stud will strike the retard lever at approximately the positions shown in Figs. 7, 8, and 9.

F. Adjust 1/10 Second.

1.) Be sure there is no side play between the bulb lever pivot and the retard setting knob where they are assembled, nor between the retard setting knob and the range finder housing. If there is any side play or lost motion at either of these points, the speeds will not read the same when the knob is turned clockwise as when it is turned counterclockwise. The speeds should read approximately the same either way.

2.) On 1/10, the bulb lever stud should go into the notch of the retard lever so the point of the retard lever strikes the flat side of the stud at about its center. The 1/10 must be adjusted so it will be within the tolerance when the index line at "1/10" on the retard knob is directly in line with the index line on the range finder housing, and when it is thrown out of line on either side of the index line on the housing about the thickness of the index line. This allows a margin of safety if the two lines are not lined up exactly when set for 1/10. All other speeds must be set directly on the line.

3.) In order to have 1/10 read approximately the same in each of the three positions, it is necessary to have the flat side of the bulb lever stud, on which the retard lever rides, so it is a 90-degree angle with an imaginary line drawn through the center of the bulb lever stud and the

center of the bulb lever screw #78030 (see Fig. 10). In moving the 1/10 from one side of the index line to the other, the point of the retard lever should travel on about the center third of the flat side of the stud, and the retard lever should not move in or out. If it does, twist the stud a little until it does not.

If 1/10 is too fast, file a little off the flat surface of the notch in the retard lever (see Fig. 11A). This moves the point which rides on the bulb lever stud away from the stud, allowing the lever to come in farther and making the 1/10 slower. If 1/10 is too slow, swedge this surface out (see Fig. 11B), which will throw the point out, preventing the retard lever from coming in so far and making 1/10 faster.

4.) Care should be used when filing or swedging this surface; a very small amount, taken off or swedged on, will make a lot of difference in the speed. Two or three light brushes across the surface with a file, or one or two taps on a swedging tool, will usually be sufficient. A little experimenting will soon show you just how much you can file or swedge at this point, and also on the 1/5 adjustment which comes later. The point that touches the bulb lever stud is the part that is important in making this adjustment, but when filing, it is necessary to file the whole surface so as not to change the angle. When swedging, place the swedging tool parallel with the flat surface, and tip it a little so most of the swedge is at the point. This adjustment should affect 1/10 only, but it may affect 1/5 at times.

5.) Be sure the bulb lever stud does not bottom in the notch of the retard lever when the speed is set at 1/10. If it does, file the notch a little deeper, being careful not to alter the speeds.

6.) If both 1/10 and 1/5 are too fast, swedge the retard lever dog (see Fig. 14), out a little, making it a little longer. This causes the mechanism to take longer to move it through the gear train, and makes the speeds slower. If they are too slow,

file a little off the tip of the dog, (see Fig. 14), making it a little shorter, and making the speeds faster. After filing the tip of the dog, file the edge of it to bring the curve down to a point again and burnish it. DO NOT file or swedge much at a time as .001" or .002" taken off or added to the dog will make a lot of difference in the speeds.

7.) Filing or swedging the dog will affect the 1/10 and 1/5 most, affecting 1/10 more than 1/5. If it is necessary to file or swedge the dog very much to bring 1/10 and 1/5 within the tolerance, it will also affect 1/2 and possibly 1 second, affecting 1/2 less than 1/5, and 1 second less than 1/2.

G. Adjust 1/5 Second.

When the shutter is set on 1/5 the retard lever will contact the bulb lever stud just above the point of the stud (see Fig. 7). If 1/5 is too fast, file a little off the point of the retard lever (see Fig. 12, A), to allow the lever to come in a little farther, making the speed slower. If 1/5 is too slow, swedge the point of the retard lever out a little (see Fig. 12, B), to make it faster. This adjustment should affect 1/5 only, but it may affect 1/10 and 1/2.

H. Adjust 1/2 Second.

1.) If 1/2 is too slow, and 1 second is on the slow side of its tolerance, the 1/2 can be speeded up the same as 1 second (see Sec. No. 23, D). Be careful not to make 1 second too fast.

2.) If 1/2 is too fast, and 1 second is on the fast side of its tolerance, the 1/2 can be slowed down the same as 1 second (see Sec. No. 23, D). Be careful not to make 1 second too slow. This adjustment may affect all retard speeds some.

3.) If 1/2 is too fast, and 1 second is on the slow side of its tolerance, file the retard lever where the bulb lever stud strikes it (see Fig. 13, A), to make it slower.

4.) If 1/2 is too slow, and 1 second is on the fast side of its tolerance, swedge the retard lever where the bulb lever stud strikes it (see Fig. 13, B), to make it faster.

5.) Filing the retard lever for 1/2 will seldom affect 1/5, if care is used to keep away from the point of the retard lever. Swedging the retard lever for 1/2 will usually affect 1/5, and may possibly affect 1/10 a little.

NOTE: After making any adjustment on 1/10, 1/5, 1/2, or 1 second, always check all of these speeds to see how much, if any, the adjustment made has affected the speeds, other than the one being adjusted. Make any additional adjustment necessary.

I. Adjust Bulb Exposure.

1.) The end of the Bulb Lever Assembly #78089, with the two lips on it, lies over the pin on the top of the retard lever, with the pin between the two lips. With the retard knob set at "B", release the shutter and hold the release button down. The pin in the retard lever moves toward the back of the Kodak, and carries the bulb lever with it until the left end of the back lip strikes the upturned lug on the front end of the release lever. This stops the retard lever, and keeps the shutter open as long as the release button is held down. When the release button is released, the lug on the release lever moves away from the bulb lever; the retard lever completes it's travel through the retard gear train and the shutter closes.

2.) The retard knob should turn clockwise until the index line at "B" is a little past the index line on the range finder housing. The shutter should stay open for a bulb exposure when the index line at "B" is set about the thickness of the line to the right of the index line on the range finder housing, and when the retard knob is at the end of its clockwise travel, or at any point between these two limits.

If the shutter does not stay open when set for "Bulb", bend the lug on the release

lever to the right a little. If it still does not stay open, bend the left end of the back lip on the bulb lever out a little, toward the back of the housing. If the lip of the bulb lever is bent back too far, it will interfere with the proper releasing of the shutter on "B".

24. Fitting New Shutter Curtains.

A. If it is necessary to fit new shutter curtains, remove the old curtains. Then remove all of the old cement (Vulcolac) from the ribbon rollers, and the long and short curtain rollers. DO NOT remove any of the black coating which is on the long and short curtain rollers. This black coating is a sizing material to which the Vulcolac, used for cementing the curtains to the rollers, will adhere better than to bare metal.

B. Be sure the ends of the curtains are square, and parallel to each other. Lay the free end of the curtain assembly long #73071 on a piece of cardboard, with the rubber side up, and the ribbons to the right. Place the Winding Curtain Clamp #68873 on the free end of the curtain and line it up with the curtain, at the curtain's end, with the hole that is nearest the end of the clamp away from you. Now with a sharp pointed instrument, make small holes in the curtain through each hole in the curtain clamp. Place the rubber side of the curtain down, and put a thin coat of Vulcolac on the end of each ribbon, about 9/16" from the end (see Fig. 16).

C. Cut the corners of the wide curtain as shown in fig. 16; place the rubber side down, and coat about 9/16" of the end of each ribbon with Vulcolac; also put a coat about 1/4" wide across the end of the curtain on the fabric side (see Fig. 16). Lay both curtains aside for a few minutes to allow the Vulcolac to set. While waiting for the Vulcolac on the curtains to set, wind the shutter, set it on 1/1000, and release it.

Turn the winding curtain roller clockwise, as far as it will go, and, with a pair of tweezers, grasp the flange of the upper ribbon roller. Be sure it is turned clockwise as far as it will go. With the Kodak face down, and the top away from you, turn the winding gear until the groove in the winding curtain roller

comes up, and goes a little past top center. Put a pencil mark across each ribbon roller, about 1/8" to the right of the right edge of the groove in the winding curtain roller.

D. Put a light coat of Vulcolac about half-way around each ribbon roller in a clockwise direction, starting at the pencil mark.

E. Put a light coat of Vulcolac on the black surface of the two grooves in the Curtain Roller Assembly-Short #73062, starting at the same place in each groove, and leaving about 1/8" uncoated.

F. 1.) Put a light coat of Vulcolac on the Curtain Roller Assembly-Long #73061, about 1/4" wide, and the full length of the roller.

2.) Wind and release the shutter. Be sure the winding curtain roller and both ribbon rollers are turned clockwise as far as they will go, and turn the winding gear until the groove in the winding curtain roller is up. Lay the long curtain on the back of the Kodak, rubber side up, with the left end of it up against the left edge of the groove in the winding curtain roller. Assemble the curtain clamp with the Curtain Clamp Screw-Long #55321 in the center hole, and the two Curtain Clamp Screws-Short #78049 in the two end holes. Be sure the curtain is parallel with the case, and tighten the screws. If the edge of the clamp projects above the roller, file it down flush with the roller; and if the heads of the screws project above the clamp, file them flush with the clamp.

3.) Slip the ends of the ribbons down between the roller and the case, and between the roller and idler shaft on the late model. Pull the ribbons and the curtain through and up, over the roller and the back of the case, so there will be 3/4 of a turn of the curtain on the roller when the shutter is released. Put a second coat of Vulcolac on the end of the upper ribbon, and, starting the end of the ribbon at the end of the coat of Vulcolac on the curtain roller short, turn the roller clockwise, smoothing the ribbon on the roller as it turns.

4.) Put the second coat of Vulcolac on the end of the lower ribbon, and cement it to the roller the same as above, starting it in the same position on the roller as the upper ribbon. Turn the curtain roller shaft clockwise until the slack is out of the curtain. Give it two or three full turns more, and lock it with the curtain shaft retainer. Wind and release the shutter two or three times, to see that the curtain winds on the winding curtain roller smoothly and evenly.

5.) If it runs to one side or the other, pull the curtain to the left until the uncemented part of the ribbons is off the roller; hold the end of the roller on the side toward which the curtain is running, and pull the opposite ribbon so it will slide around on the roller a little. Let the ribbons wind back on the roller evenly; recheck and repeat if necessary until the curtain winds on the winding roller evenly.

6.) The curtain must wind straight, without bulging anywhere, and the end of the curtain must be square with the aperture in the case. If the curtain rides up on, or piles up against the flange at the upper end of the winding curtain roller, it may cause the roller to bind.

G. 1.) When the long curtain is adjusted so it winds properly, wind the shutter and leave it wound. This should bring the right end of the curtain above the right side of the winding curtain roller, when the shutter is set at 1/1000. Turn the curtain roller long, so the section that is coated with Vulcolac is toward the left end of the Kodak, and the right edge of the strip of Vulcolac is just visible below the right edge of the curtain roller short.

2.) Put a second coat of Vulcolac across the end of the short curtain; lay the curtain on the back of the case rubber side out, with the left end against the right end of the long curtain and line it up parallel with the case. Hold it in this position by pressing two fingers of the left hand down against the upper and lower part of the case. Slide one finger of the right hand down over the curtain and the curtain

rollers until it is against the case; press it against the roller, and turn the roller and curtain counterclockwise until the finger is over the cemented portion of the curtain and roller; slide it back and forth over the length of the roller, smoothing the curtain onto the roller.

3.) Release the shutter, and turn the winding gear until the pencil marks on the ribbon rollers are up. Bring the lower ribbon over the top of the ribbon roller, pass it underneath the ribbon roller from the left, and up between the roller and the case. Put a second coat of Vulcolac on the end of the ribbon, and cement it to the roller, starting the end of the ribbon at the pencil mark, and smoothing it out clockwise around the roller. Keep the edge of the ribbon against the flange of the roller, but do not let it ride up on the flange. Pass the upper ribbon down between the speed throwout lever shaft and the ribbon roller, underneath the roller, and up between the case and the roller, and cement it to the roller the same as the lower ribbon.

NOTE: On the late model be sure the ribbons pass underneath the ribbon rollers and between the idler shaft and the rollers.

4.) Release the shutter. Turn the curtain roller shaft clockwise until the slack is out of the curtain. Give it three or four full turns more, and lock it with the curtain shaft retainer. Wind the shutter to see that the curtain lies smooth and straight across the back of the Kodak. If it pulls to one side or the other and wrinkles, release the shutter, pull the curtain out until the uncemented part is off the roller, hold the end of the roller on the side toward which the curtain is running, and pull the opposite side of the curtain so it will slide around on the roller a little bit. Wind the shutter, check the curtain, and repeat if necessary until the curtain winds evenly without wrinkling.

NOTE: In adjusting the curtains to wind straight, do not pull the curtain or ribbons off the rollers, but pull them so they will slide around on the rollers.

5.) When both curtains are adjusted so they wind properly, the short curtain will probably overlap the long curtain a little when the shutter is wound. They must now be adjusted so they have the proper opening (.028" to .030") at 1/1000.

6.) With the shutter wound, hold the dummy speed setting knob so the mechanism and curtains cannot turn when the shutter is released (see Sec. No. 23, A, 2). Pull the shutter release down; hold it, and let the knob and mechanism turn slowly until the ends of the curtains are at the left edge of the aperture. If they overlap, or if the slit is too narrow, let go of the speed setting knob and let the shutter close. Grasp the upper curtain ribbon near the ribbon roller, and pull it toward the right end of the Kodak, so the ribbon will slide around the roller a very little bit.

7.) Wind the shutter, check the opening, and repeat if necessary until the opening is .025" to .028". If the curtain ribbon is pulled too far, and the opening is too wide, hold the ribbon roller flange with a pair of tweezers, and work the ribbon back a little with a screw driver, being careful not to tear it. When the curtain opening is adjusted to .025" to .028", pull the lower curtain ribbon around the ribbon roller until the end of the curtain is exactly parallel with the case, when the shutter is in the released position. Clean any excess Vulcolac from the outer side of the ends of the short curtain ribbons, and from the ribbon rollers.

8.) When the curtains are properly adjusted, put the Kodak in an oven that can be kept at an even temperature of from 110 to 115 degrees F. 18 hours. This thoroughly dries the Vulcolac, and prevents the curtains and ribbons from sliding on the rollers, which would change the curtain opening. If it is not baked, the Vulcolac stays tacky. It is necessary to work fairly fast when cementing and adjusting curtains, so as to get them adjusted before the Vulcolac sets too much, making it hard to move them.

NOTE: It is better when fitting new curtains to adjust them so the slit is a little narrow (.025" to .028" as above) than to set them at the proper opening of .028" to .030" because the ribbons may slip a little before the Vulcolac is thoroughly dried, which would cause the opening to become too wide. It is easier to adjust the opening if it is too narrow than if it is too wide.

9.) After the curtains are baked, adjust the tension on the curtain roller tension springs as described in Sec. 7. "Preliminary Setting of Curtain Tension."

Wind the shutter and check the curtain opening. If it is not correct, adjust it as described in Sec. 23, A.

When the curtains are fitted and adjusted properly, proceed to adjust the speeds as described in Sec. 23, B to I inclusive.

25. Adjustment of View Finder.

A. Screw a lens into the front of the Kodak.

B. Check the Front Finder Lens Bracket Assembly #73093 (see Fig. 5); see that it has very little side play, and works absolutely free. If it binds or has too much play, refit the screw, using Tool No. 500 N.

C. 1.) Adjust the Front Finder Lens Bracket Spring #72151 so it has just enough tension to throw the bracket out about 1/8" from the top of the Range Finder Housing, when the housing is held in a vertical position with the release button end up. This is to be sure the Finder Lens Bracket will work when taking a vertical picture. With the Kodak in a normal position the Finder Lens Bracket would drop of its own weight even though the spring was a little weak.

2.) When the focusing ring on the lens is turned from infinity toward 3-1/2 feet, the Range Finder Focus Lever #64923 (see Fig. 17) is forced backward by the cam on the back of the lens, and the Front Finder Lens Bracket drops down. When the focusing ring is turned from 3-1/2 feet toward

infinity the Range Finder Focus Lever #64923 is forced forward by the Eye Piece Focus Lever Spring #72132 (see Fig. 17) In moving forward the Focus Lever has to push the Finder Lens Bracket up. The Finder Lens Bracket rides on a cam near the left end of the Range Finder Focus Lever (see Fig. 17). If there is too much tension on the Eront Finder Lens Bracket Spring, it will counteract the tension of the Eye Piece Focus Lever Spring, and neither the Range Finder Focus Lever nor the Finder Lens Bracket will complete its full travel.

D. See that the front end of the Range Finder Light Guard #72131 (see Fig. 17) is up on the projecting edge of the Erecting Prism Mount #64933, and against the Erecting Prism and Collective Lens Assembly #57278. This is important, because when the Range Finder Housing is on the Kodak there is very little clearance between the end of the Finder Lens Bracket and the Erecting Prism Mount, and if the light guard is not up on the edge of the Prism Mount it will prevent the Finder Lens Bracket from working properly.

E. 1.) Put the Range Finder Housing on the Kodak, set the View Finder Compensating Lever Knob #64940 (see Fig. 4) at "75", and turn the Finder Eye Piece Lens Mount #64948 out as far as possible. Look into, not through, the view finder and while turning the focusing ring on the lens you can see the Front Finder Lens Bracket move up and down.

2.) When the focusing ring is turned from 3-1/2 feet toward infinity the Finder Lens Bracket will move up, and vice versa. The Finder Lens Bracket must continue to move as long as the Focusing Ring moves, and must not stop before the Focusing Ring has completed its full travel in either direction.

3.) If the Finder Lens Bracket stops before the Focusing Ring comes to a stop at the end of its travel, find the cause and correct it. It may be caused by a bind in the Finder Lens Bracket or the Range Finder Focus Lever, too much tension on the Finder Lens Bracket Spring, too little

tension on the Eye Piece Focus Lever Spring, or the Range Finder Light Guard may be off the Erecting Prism Mount.

F. 1.) When the Front Finder Lens Bracket is working properly, mount the Kodak on the mounting plate of the view finder aiming target (Tool No. 500, 1-2) -- be sure it is screwed tight to the plate. Set the View Finder Compensating Lever Knob at "153", turn the Finder Eye Piece Lens Mount out as far as possible, and slip the target eye piece (Tool No. 500, 1-4) on the end of the Finder Eye Piece Lens Mount.

2.) With the focusing ring on the lens set at infinity, the small rectangle in the center of the target should be centered in the view finder, if the finder is aiming properly. The short lines just outside of the rectangle are tolerance limits --- the target can be off in the finder to one side, or at the top or bottom until these lines can just be seen, and still cover the subject satisfactorily.

3.) If the target is too high in the view finder, remove the Range Finder Housing, loosen the two Finder Lens Basket to Bracket Screws #49291, move the basket and lens toward the top of the Finder Lens Bracket and tighten the screws.

If the target is too low, move the basket and lens down on the bracket.

If the target is too far to the right, move the basket and lens to the right on the bracket.

If the target is too far to the left, move the basket and lens to the left on the bracket.

Replace the housing, recheck and readjust, if necessary, until the target is centered within the tolerance limits.

G. After the target is centered at "153", turn the View Finder Compensating Lever Knob to "50". Turn the Finder Eye Piece Lens Mount in as far as possible without pushing the target eye piece off, and check the view finder. At "50" the large rectangle on the chart should be centered in the finder within the tolerance

limits, when the focusing ring on the lens is at infinity. When the focusing ring is turned to 3-1/2 feet, the target should move up in the finder until the two horizontal dotted lines on the target are centered in the finder.

As a rule, when the target is centered within the tolerance limits at "153", it will be within the tolerance limits at "50". It may be necessary at times to throw the target off center at "153" to the limit of tolerance, in order to bring it within the tolerance at "50". Be sure the View Finder Lens Compensating Lever Assembly #73092 (see Fig. 5) does not bind on the Guide Stud #64922.

26. Adjusting the Range Finder.

NOTE: For adjusting the Range Finder, make a chart like the one shown in Figure 18, and hang it approximately 50 feet from the work bench. This distance does not have to be exact. The chart can be closer if space does not allow 50 feet, but it should not be closer than 25 feet. Be sure the two parallel lines are exactly 4-1/8" from center to center. The triangle is used for adjusting the halving, and the two vertical lines for adjusting the coincidence.

A. Adjust Halving.

1.) With the Range Finder Housing on the Kodak, and the Housing to Case Screws tightened, look through the Range Finder at the triangle on the chart. Set the dividing line in the range finder across the triangle, so that part of the triangle is in the upper field (above the dividing line), and part in the lower field (below the dividing line). Turn the focusing ring on the lens so the lower half of the triangle is directly below the upper half. The triangle will then look like either A, B, or C in Fig. 19.

2.) If it is a perfect triangle across the dividing line as in Fig. 19 A, the halving adjustment is correct. If it looks like B or C, the halving adjustment is incorrect, and must be adjusted until it looks like A. In Fig. 19 B, the lower image is too high and in Fig. 19 C, the lower image is too low.

3.) When adjusting the halving, it will be necessary to remove the range finder housing to make the adjustment, and to replace it to check the adjustment. If the lower half of the triangle is too high, as in Fig. 19 B, turn the End Prism Mount Screw #59908, in the corner of the End Prism Mount-Large #64925 (see Fig. 17), counterclockwise a very small amount. If the lower half is too low, as in Fig. 19 C, turn the End Prism Mount Screw clockwise.

4.) Check the range finder with the housing off the Kodak and adjust it until the triangle looks like Fig. 19 A. Put the housing on the Kodak, screw the Housing to Case Screws down tight, and check the Range Finder. If the triangle looks like B or C, Fig. 19, it is due to distortion of the top of the case and the range finder base, when the Housing to Case Screws are tight.

In this case, note approximately how far the halving is off, remove the housing, adjust the halving until it is off approximately the same amount in the opposite direction, replace the housing, recheck, and readjust if necessary. Be sure the Housing to Case Screws are screwed tight each time the housing is put on the Kodak.

5.) When the halving adjustment is correct, put the magazine on the Kodak, screw it on tight, and check the Range Finder. The magazine will sometimes distort the case enough to throw the halving out. If it does, remove the magazine and housing and readjust the halving, allowing for the distortion, until you have a perfect triangle across the dividing line of the range finder, with both the housing and the magazine on the Kodak. The halving can be off, one way or the other, not more than half the thickness of the line on one side of the triangle, when the other side of the triangle is in line (see Fig. 19 D).

NOTE: The halving adjustment can be made with the End Prism Mount Screw, only if a small adjustment is necessary. If it is necessary to make a large adjustment, loosen the two screws in the objective bracket (see Fig. 17), and move the objective mount up or down on the bracket until the two halves

of the triangle are close; tighten the screws, and make the final adjustment with the End Prism Mount Screw. If too much adjustment is made with the End Prism Mount Screw it will throw the lower field out of parallel with the upper field. Make them parallel by tightening or loosening the End Prism Mount Screw, make the adjustment as close as possible by moving the objective mount up or down, and make the final adjustment with the End Prism Mount Screw.

B. Adjust Range Finder Focus Lever.

1.) The end of the Range Finder Focus Lever which projects out through the top of the Stationary Lens Mount must be adjusted to the proper lateral position in order to be able to interchange the various lenses. The Range Finder can be adjusted to any one of the lenses for the Kodak Ektra, and will give the proper focus for that one lens, regardless of the lateral position of the focus lever. If the focus lever is off laterally, however, it will not give the proper focus for any other lens.

2.) In order to check and adjust the lateral position of the Range Finder Focus Lever #64923, it will be necessary to have a 35-mm. lens and a 153-mm. lens. There is a cam on the back of the lenses, on which the end of the Range Finder Focus Lever rides. The pitch of this cam is different on each of the different focal length lenses. The cams on the 35-mm. and 153-mm. lenses are the two extremes, the cam on the 35-mm. lens having the steepest pitch and the cam on the 153-mm. lens having the shallowest pitch. If the Range Finder Focus Lever is adjusted laterally so it gives exactly the same reading with 35-mm. lens as with the 153-mm. lens, it will be correct for the other lenses.

3.) Put the 153-mm. lens on the Kodak, and be sure it is seated tight. Set the focusing ring at infinity, look through the Range Finder at the range finder adjusting chart (Fig. 18), and have the dividing line of the Range Finder across the two vertical lines on the chart. Adjust the range finder coincidence until the right

line in the lower field is directly below the left line in the upper field (see Sec. 26, C).

4.) Remove the 153-mm. lens and put the 35-mm. lens on the Kodak. Set the focusing ring at infinity, and look through the Range Finder at the lines on the chart. If the right line in the lower field is directly below the left line in the upper field, as it was with the 153-mm. lens, the lateral position of the Range Finder Focus Lever is correct. If the lower line is to the right or left of the upper line, however, the lateral position of the Range Finder Focus Lever is incorrect, and the lever must be adjusted.

5.) If the lower right line is to the left of the upper left line, remove the lens and bend the end of the range finder focus lever very slightly toward the right end of the Kodak. If it is to the right of the upper line, bend the lever toward the left end of the Kodak, being careful not to bend it in or out. Put the 153-mm. lens on the Kodak, and readjust the coincidence. Remove the 153-mm. lens, and put the 35-mm. lens on. Check the Range Finder and readjust the lever, if necessary, until the Range Finder is exactly the same with both 35-mm. and 153-mm. lenses. It will be necessary to check the Range Finder with both lenses after each adjustment of the Range Finder Focus Lever, because if the Range Finder Focus Lever is bent in or out a little, while bending it sideways, the position of the lines will change.

C. Adjust Range Finder Coincidence.

1.) When the halving and the lateral position of the Range Finder Focus Lever are properly adjusted, remove the small cap (Range Finder Adjusting Hole Cap #85382) from the right end of the back of the Range Finder Housing. This cap can sometimes be removed by placing the rubber end of Tool No. 500 W (tool for tightening the cap) tightly against the plug, and turning it counterclockwise. If it can, the cap is not damaged and can be used again.

2.) If it cannot be removed with Tool No. 500 W, slip Tool No. 500 T into the Accessory Finder Bracket #78041 on top of the Range Finder Housing (see Fig. 14), with the large hole over the cap. Insert Tool No. 500 R through the hole, press it tightly against the plug, and turn it counterclockwise. This damages the head of the cap, and for appearance it will be necessary to fit a new cap. If appearance is not important the old cap can be used again. Most of these caps are shellacked to keep them from working out, and the second method of removing them will be necessary.

3.) Look through the range finder at the two vertical lines on the range finder adjusting chart (Fig. 18), and have the dividing line across the vertical lines on the chart. When the focusing ring is turned toward infinity, the two lines in the lower field will move to the left; when the focusing ring is turned toward $3\frac{1}{2}$ feet, the two lower lines will move to the right; they must continue to move as long as the focusing ring is turned in either direction.

4.) If the image in the lower field stops moving before the focusing ring has reached the end of its travel in either direction, locate the cause and correct it. It may be caused by a bind in the Front Finder Lens Bracket, or the Range Finder Focus Lever; too much tension on the Front Finder Lens Bracket Spring; too little tension on the Eye Piece Focus Lever Spring; or the Range Finder Light Guard may be off the end of the Erecting Prism Mount.

5.) If the right line in the lower field is directly below the left line in the upper field when the focusing ring stops at infinity, as in Fig. 20 A, the coincidence adjustment of the range finder is correct.

If the right line in the lower field is to the left of the left line in the upper field, as in Fig. 20 B, insert a small screw driver through the hole in the back of the Range Finder Housing and into the head of the Coincidence Prism Adjusting Screw #5892 (see Fig. 17). Turn the screw clockwise a very small amount.

If the right lower line is to the right of the left upper line, as in Fig. 20 C, turn the Coincidence Prism Adjusting Screw counterclockwise.

Check the range finder, turning the focusing ring away from, and back to infinity, and readjust, if necessary, until the lines are the same as in Fig. 20 A.

6.) When the focusing ring is turned until it stops at infinity, the lower right line must not stop short of the upper left line. It must at least come up even with the left upper line, but it can go past the upper line not more than half the thickness of the line, as in Fig. 20 D. It is better to adjust the coincidence so the lower right line will come up to and go past the upper left line a very little bit, as in Fig. 20 D, to be sure that it will always at least reach it.

7.) When the coincidence is properly adjusted replace the cap in the back of the Range Finder Housing, using Tool No. 500 W. When the range finder is adjusted so it coincides properly at infinity, it will give a correct reading and focus at all distances on the focus scale.

27. Focus Adjustment.

A. Be sure the lens seat is clean. The lens seat is the 1/16" shoulder inside the Lens Mount Assembly #73069 on the front of the Kodak. Be sure the four milled bearing surfaces inside the Kodak case and on the front of the magazine are clean. This is important, because a few particles of dust or dirt on these surfaces will make a difference of .004" or .005" in the distance from the lens to the film track, which is more than enough to throw the focus out.

B. Check and Adjust Focus of Magazine.

1.) Remove the lens, place the magazine on the Kodak, screw it tight, and remove the back from the magazine. Place the supporting block for focusing the magazine (Tool No. 500 A-1) on a surface plate which has a dial gauge graduated in 10,000ths. Place the focusing height check gauge (Tool

No. 500 A-2) on the supporting block, and slide them both under the dial gauge. With the plunger of the dial gauge resting on the top of the height check gauge, adjust the dial gauge to read "0."

2.) Remove the height check gauge from the supporting block, and place the Kodak face down on the supporting block, so the lens seat is resting on the top of the block. The distance from the lens seat to the film track in the magazine should be 1.114", plus or minus .001". The distance from the lens seat to the four milled bearing surfaces just outside the film track, on which the four prongs of the film Pressure Pad Assembly #73033 rest when the magazine back is closed, should be 1.123", plus or minus .001". This leaves a clearance of .009" between the film track and the pressure pad. The height check gauge (Tool No. 500 A-2) is exactly 1.114". With the dial gauge set at "0", it should read "0", plus or minus .001", when the plunger is resting on the film track. It should read .009", plus or minus .001", on the four bearing surfaces.

3.) If any or all of the bearing surfaces are too high (more than .010" on the dial gauge), remove the magazine, and lay it face down on the bench. With a piece of fibre and a hammer, strike the high surfaces lightly, driving them down a little. If any or all of them are too low (less than .008" on the dial gauge), remove the magazine, lay it face up on the bench, and drive the low surfaces up a little.

If the bearing surfaces at the top of the magazine are low, strike the casting between the top edge of the casting and the top edge of the magazine shutter cover, opposite the bearing surfaces. If the lower surfaces are too low, slide the magazine shutter slide down even with the bearing surface; strike the magazine shutter cover over the shutter slide, which will support the shutter cover and prevent it from being dented.

4.) Place the magazine on the Kodak, and check all four bearing surfaces. Readjust, if necessary, until they are all within the

tolerance, .008" to .010". The four bearing surfaces and the film track will now be in focus, and the film track and pressure pad will be square with the lens.

C. Check and Adjust Focus of Pressure Pad.

1.) Put the back on the magazine and lock it. Wind the shutter and set it at "B". Remove the Release Button Plug Screw #72153 (Fig. 4), screw a #1 T.B.I. Cable Release into the release button, and open the shutter on "B". Lay the Kodak face up on the bench, and place the focusing fixture (Tool No. 500 L) into the lens mount so it rests on the lens seat. The thickness of the focusing fixture is exactly one inch. Place a depth micrometer (2" to 3" spindle) on the top of the focusing fixture, with the spindle through the hole, and turn the spindle down slowly until the small light in the fixture just lights.

2.) The micrometer should read .123", plus or minus .001", at the instant the fixture lights. If it is more than .124" or less than .122", remove the back from the magazine, and remove the pressure pad from the back. Bend the pressure pad through the center horizontally, up or down a little. Replace the pressure pad and back, recheck, and readjust, if necessary, until the pressure pad measures between .122" and .124", which including the 1" of the fixture, will be 1.122" to 1.124". Remove the cable release, and replace the release button screw.

TROUBLES - CAUSES - AND - REMEDIES

1. Wide curtain stays open when shutter is wound.

Cause	Remedy
Speed Curtain Pawl Spring #65076 (see Fig. 1) is off the Speed Curtain Pawl #64905.	If Spring is not damaged, place it back in the groove on the back of the pawl. If it is damaged, fit a new spring.

2. Shutter does not close on 1 second or bulb.

Cause	Remedy
(a) The retard gear train is dirty and sluggish.	(a) Remove the shutter mechanism plate assembly. Wash out the retard gear train by running it in Carbon Tetrachloride, then dry it thoroughly. Run it out in powdered flake graphite, and be <u>sure</u> to blow <u>all</u> of the graphite out of the mechanism. Oil the shutter drive disc, intermediate curtain winding gears, delayed action motor, and retard lever lightly. Be careful not to get any oil on or near the retard gear train. (<u>Note</u>: The gear train can be run out in graphite, <u>only</u> if it is cleaned with Carbon Tetrachloride, or some other cleaning agent, which will dry thoroughly and leave no oily film on the mechanism. If gasoline or benzine or any cleaning agent of this type is used it will leave an oily film which will pick up and hold some of the graphite and will, in a short time, become gummy and cause the gear train to become sluggish.)
(b) the curtain roller bearings may be dry.	(b) Oil the end bearings of all three curtain rollers.

3. High speed cannot be set.
High speed dial drops back when set to a high speed.

Cause	Remedy
Speed Setting Lock #77919 broken.	Fit new Speed Setting Shaft Assembly #78088.

4. Shutter cannot be released.

Cause	Remedy
Teeth broken off of Main Drive Shaft Locking Ratchet #64839, allowing Main Drive Shaft to drop back.	Fit new Main Drive Shaft Locking Ratchet.

5. Main drive shaft turns without winding shutter.

Cause	Remedy
The Shutter Lock Spring is off of the shutter lock.	Put the Shutter Lock Spring #72166 back on the shutter lock, or fit a new spring.

6. Shutter opens while changing speeds.

Cause	Remedy
Speed Throwout Lever #64830 releases wide curtain too soon.	Readjust the Stud for End Curtain Release #77956, in the under side of the Release Lever Assembly #73079.

7. Release button does not lock.

Cause	Remedy
The lug is broken out of the Release Button Bushing.	Fit new Release Button Bushing #64843, Release Button #64842 and Tension Washer for Release Button Screw #81046.

8. Delayed action does not work.

Cause	Remedy
The delayed action gear train is dirty and sluggish.	Wash out the delayed action gear train in Carbon Tetrachloride, and run it out in graphite, (see 2, p. 49).

9. Range finder does not work.

Cause	Remedy
(a) Bind in Range Finder Focus Lever #64923.	(a) Refit Range Finder Focus Lever.
(b) Bind in Front Finder Lens Bracket #64935.	(b) Refit Front Finder Lens Bracket.
(c) Too much tension on Front Finder Lens Bracket Spring #72151.	(c) Decrease tension of Front Finder Lens Bracket Spring.
(d) Too little tension on Eye Piece Focus Lever Spring #72132.	(d) Increase tension of Eye Piece Focus Lever Spring.
(e) Range Finder Light Guard #72131 off of Erecting Prism Mount #64933.	(e) Put front end of Range Finder Light Guard up on end of Erecting Prism Mount.

10. View finder parallax adjustment does not work.

Cause	Remedy
Same as No. 9 - a, b, c, d, and e.	Same as No. 9 - a, b, c, d, and e.

11. Lower field of range finder blank.

Cause	Remedy
Upper prism of Coincidence Prism Assembly #65152 separated from lower prism.	Fit new Coincidence Prism and Base Assembly #86785.

12. Both fields of range finder blank.

Cause	Remedy
Coincidence Prism Assembly separated from base.	Fit new Coincidence Prism and Base Assembly #86785.

13. Exposures overlap.

Cause	Remedy
(a) Shutter can be released before it is fully wound.	(a) Adjust the release lever so the shutter cannot be released until it is fully wound.
(b) Tension spring in take-up spool is weak.	(b) Increase the tension of the Take-up Spool Tension Spring #85384 or fit a new one.

14. Film does not wind.

Cause	Remedy
(a) Tension spring in take-up spool is weak.	(a) Increase the tension of the Take-up Spool Tension Spring #85384 or fit a new one.
(b) Magazine winding gear pawl spring is off of the pawl.	(b) Put the magazine spring for Winding Gear Pawl #65078 back in the groove on the back of the pawl, or fit a new one.
(c) Clutch teeth broken off of the end of the sprocket sleeve assembly.	(c) Fit a new Sprocket Sleeve Assembly #73040.

15. Magazine Casting broken near upper end of sprocket.

Cause	Remedy
Trying to wind the magazine without pushing the magazine shutter slide over to the "lock" position.	Fit magazine parts to a new Magazine Casting #65100.

16. Late style Sprocket Shaft Lock broken.

Cause	Remedy
Trying to wind magazine without pushing the magazine shutter slide all the way over to the "lock" position.	Fit new late style Sprocket Shaft Lock #86603.

17. Clutch teeth broken from end of Sprocket Sleeve Assembly.

Cause	Remedy
Same as No. 16.	Fit new Sprocket Sleeve Assembly #73040.

DISASSEMBLY OF MAGAZINE

1. Remove and Disassemble Back.

   A. Unlock the back, pull the hinge pin out as far as possible, and remove the back from the magazine.

   B. Remove the Film Tension Pad Screw #74111, and then remove the Pressure Pad Assembly #73033 by pulling it slightly toward the right end of the back.

   C. Remove the Sprocket Shoe Screws (2) #11129, and lift off the Sprocket Shoe #72104.

   D. Remove the Winding Handle Screw #64980, using the wide end of Tool No. 500 C. Remove the Winding Handle Ratchet #64981, and the magazine Winding Gear Assembly #73029 from the inside of the back. Remove the Winding Handle Assembly #73028 after disconnecting the Winding Handle Return Spring #65138 from the winding handle.

2. Remove the Spool Throw-out Lever Screw #65124, and the Throw-out Lever Assembly #73043.

3. Remove the Take-up Gear Assembly Screws (3) #56734, and the Take-up Gear Assembly #73037.

4. Swing the Take-up Gear Pawl #72125 down past the Take-up Spool Core, and pull out the Take-up Spool Core #65122 and the Take-up Spool Clutch Assembly #73039. Be careful not to lose the Take-up Spool Tension Spring #85384, which is wrapped around the Take-up Spool Core.

5. Lift the Take-up Spool Assembly #73038 and the Take-up Spool Core Washer #65174 out of the casting.

6. Remove the Magazine Shutter Cover to Magazine Rivets (4) #78043 and Magazine Shutter Cover Screws (4) #56570, and remove the Magazine Shutter Cover #65007.

7. Remove the Magazine Shutter Slide Assembly.

   To remove the Magazine Shutter Slide Assembly #88228 (old style #73047), slide the shutter slide over to the right end of the magazine. Slip the spring steel clip (Tool No. 500 GG) over the Shutter Slide

Guard Assembly #73046, slide the shutter slide back over the clip, pry up the free side of the shutter slide until the two prongs rest on the clip, and slip the shutter slide off.

NOTE: This metal clip prevents scratching the shutter slide guard, and helps in removing and replacing the shutter slide.

8. Remove the Hinge Section to Magazine Screws (Long) (2) #61311 and remove the Shutter Slide Guard Assembly #73046. Remove the Magazine Shutter Slide Lock #87005. Magazine Shutter Slide Lock Plunger #87006 and the Magazine Shutter Slide Plunger Spring #87007. Pull the hinge pin out of the Hinge Section #87004 (old style #72124), and remove the Hinge Section.

NOTE: The three parts #87005, #87006, and #87007 are on the late style magazine only. The shutter slide lock on the old style magazine is part of the shutter slide.

9. Remove the Magazine Lock Plate Screws (4) #56570, and the Magazine Lock Plate #65148, the round, black plate, on the upper left end of the magazine. After removing it, it is possible to reach down through the hole underneath it to remove the rewind Key Plate Screws.

10. Remove and Disassemble the Rewind Crank Assembly.

A. With the long screw driver (Tool No. 500 U), reach down through the hole in the upper side of the magazine; remove the rewind Key Plate to Magazine Screws (2) #72117, and pull the Rewind Crank Assembly #73036 out of the casting.

B. Remove the Key Web Screw #66892, and remove the Rewind Key Web #83499, Rewind Key Web Washer #72113, Supply Spool Hub Yoke #65110, and the Rewind Key Web Spring #83498.

C. Remove the Locking Plate to Key Collar Screws (2) #55321, the Locking Plate for Key Collar #72116, and the Rewind Key Plate #65101.

D. Push out the Rewind Key Pin #65145, and remove the Winding Key #65102, Rewind Key Shaft #83500, and the Rewind Key Spring #72110 from the Key Collar #65103.

11. With the long screw driver (Tool No. 500 U), remove the Key Plate to Magazine Screws (2) #72117. Then remove the Dummy Key Plate #65111, the Magazine Counter Dial Assembly #73103, and Hinge Pin #65134.

12. A. On the late style magazine, remove the Sprocket Shaft Lock Spring Screws (2) #86605, the Sprocket Shaft Lock Spring #86604, and the Sprocket Shaft Lock #86603. The late style Sprocket Shaft Lock is long, is located near the bottom of the magazine, and locks in the Sprocket Clutch #86606.

B. On the old style magazine, remove the Sprocket Shaft Lock Support Screws (2) #56736, the Sprocket Shaft Lock Support #72119, the Sprocket Shaft Lock Spring #65140, and the Sprocket Shaft Lock #65175. The old style Sprocket Shaft Lock is short, is located near the top of the magazine, and locks in the Sprocket Winding Gear.

13. Remove Sprocket and Shaft Assembly.

A. Turn the Sprocket Shaft and look for a small file mark on the old style Sprocket Clutch #65032, or on the Sprocket Shaft #65128 near the late style Sprocket Clutch #86606. With this mark up, if the magazine is a late style one, put a small mark on the hub of the sprocket Winding Gear Assembly #87294 near the taper pin hole.

B. Turn the shaft a half turn, so the marks are down, and drive out the Taper Pin #78053.

C. Remove the Sprocket Shaft Bearing Lower #65126, pull out the Winding Gear Key #65031, and lift the Sprocket and Shaft Assembly #87295 (old style #73042) out of the magazine, upper end first.

REASSEMBLING AND FITTING MAGAZINE

1. Reassemble Sprocket and Shaft Assembly.

A. Put a little oil on the Sprocket Shaft #65128, and put the Sprocket Sleeve Assembly #73040 and the late style Sprocket Clutch #86606 on the

shaft (the old style Sprocket Clutch #65032 does not come off the Shaft, unless the pin is removed). Be sure the Sprocket Sleeve spins freely on the Shaft, and the Clutch slides in and out without binding on the pin. Put the Winding Gear Assembly #87294 (old style #73041) on the upper end of the Shaft, and put the Sprocket and Shaft Assembly into the magazine, lower end first.

B. Put a little oil on the lower end of the Sprocket Shaft, and screw the Sprocket Shaft Bearing Lower #65126 into place.

C. There is a small file mark on the edge of the Winding Gear Key #65031. With the magazine lying face up, put the key into the magazine with the file mark up, and turn the Winding Gear so the mark near the taper pin hole is up (on the old style magazine turn the Winding Gear so the step cut in the side of the hub is toward the right end of the magazine). Turn the shaft so the file mark at the lower end is up, line up the taper pin holes, and drive in the Taper Pin #78053.

NOTE: The file marks on these three parts will enable you to line up the taper pin holes so the tapers will all be the same way.)

D. Be sure the Sprocket Shaft turns freely in the magazine, and be sure the Sprocket turns freely on the Shaft when the Clutch is disengaged.

2. A. On the late style magazine, reassemble the Sprocket Shaft Lock #86603, the Sprocket Shaft Lock Spring #86604, and the Sprocket Shaft Lock Spring Screws (2) #86605.

B. On the old style magazine reassemble the Sprocket Shaft Lock #65175, the Sprocket Shaft Lock Support #72119, the Sprocket Shaft Lock Support Screws (2) #56736, and the Sprocket Shaft Lock Spring #65140.

3. Fit New Sprocket Shaft Lock.

A. When fitting a new Sprocket Shaft Lock, either old or late style, see that it works freely in its place in the magazine.

B. Turn the Sprocket Shaft until it stops against the Sprocket Shaft Lock. Lay the winding gear key gauge (Tool No. 500 E) on the magazine, and check the angle of the Key, which should turn past center to approximately a five degree angle (see Fig 21). File the locking end of the Lock until the angle of the key is correct. If the Lock is too short, and the key turns too far, swedge the Lock a little.

C. On the old style magazine, put the Lock in place, slide it away from the shaft as far as it will go, and see that it clears the hub of the Winding Gear.

D. There should be not more than .002" or .003" clearance between the Lock and the hub of the Winding Gear. Bend the end of the Lock until the clearance is correct. Be sure the Taper Pin in the Sprocket Shaft does not project on either side of the winding gear hub, or it will catch on the Lock.

4. If the Hinge Pin #65134 has been removed from the Magazine Counter Dial Assembly #73103, put it back in place. Put the Magazine Counter Dial Assembly on the magazine, so the screw holes are lined up and the Hinge Pin is in the grooves in the casting. Place the Dummy Key Plate #65111 over the Counter Dial Assembly with the two grooves over the Hinge Pin, and assemble the dummy Key Plate to Magazine Screws (2) #72117.

5. Reassemble and Refit Rewind Crank Assembly.

A. Place the Rewind Key Spring #72110 on the Rewind Key Shaft #83500, and put the Shaft and Spring into the rewind Key Collar #65103 so the small pin in the Shaft will go into the groove in the collar. Put the Winding Key (handle) #65102 in place, and push the Rewind Key Pin #65145 through the collar and key.

B. Put the Rewind Key Plate #65101, over the rewind key collar, put the Locking Plate for Key Collar #72116 in place, and assemble the Locking Plate to Key Collar Screws (2) #55321.

C. Place the Rewind Key Web Spring #83498 over the end of the Rewind Key Shaft, place the Supply Spool Hub Yoke #65110 over the Rewind Key Plate, put the Rewind Key Web #83499 over the end of the shaft, put the Rewind Key Web Washer #72113 onto the end of the shaft, and assemble the Key Web Screw #66892.

D. Put the Rewind Crank Assembly #73036 into the casting, with the handle pointing toward the left end of the casting and parallel with it, and assemble the rewind Key Plate to Magazine Screws (2) #72117. The Key, or handle, should raise and lower easily and smoothly, and have very little play when folded.

6. Clean the old filler from the recess in the upper right end of the casting, apply a fresh coat of black filler to prevent light leak, and reassemble the Magazine Lock Plate #65148 with the Magazine Lock Plate Screws (4) #56570.

7. A. Pull the Hinge Pin out as far as possible, lay the Hinge Section #87004 (old style #72124) on the magazine, and push the Hinge Pin in to hold it there.

B. Put the Magazine Shutter Slide Lock #87005 into the hole in the hinge section and casting, put the Magazine Shutter Slide Plunger Spring #87007 into the Lock, and put the Magazine Shutter Slide Lock Plunger #87006 into the Spring.

(NOTE: Skip this paragraph on the old style magazine.)

C. Put the Shutter Slide Guard Assembly #73046 in place, assemble the Hinge Section to Magazine Screws (Long) (2) #61311, pull them down tight, and back them off a half turn.

D. Pull the Hinge Pin out, put the back on the magazine, push the Hinge Pin in, close and lock the back, tap the magazine lightly on the bench, and tighten the screws. The screw holes in the Hinge Section are elongated, and this procedure locates the Hinge Section in the proper place.

E. Remove the back.

8. Reassemble the Magazine Shutter Slide Assembly.

A. Put the assembling clip (Tool No. 500 GG) over the left end of the Shutter Slide Guard Assembly #73046. Be sure the Magazine Shutter Slide Assembly #88228 (old style #73047) is formed properly (see Section 9), slide it down over the clip into place, slide it to

the right, off of the clip, and remove the clip. Be sure the Shutter Slide slides smoothly and easily.

B. On the old style magazine, be sure the lock E (Fig. 22) which is part of the slide, drops into the hole in the sprocket end of the hinge section, and locks the slide closed.

C. To operate the Shutter Slide when the magazine is off the Kodak, press the lock in and move the slide. When the magazine is put on the Kodak, the bottom of the Kodak presses the lock in and unlocks the Shutter Slide.

9. Fit New Magazine Shutter Slide Assembly.

A. When fitting a new Magazine Shutter Slide Assembly #88228 (old style #73047, see that the long part of the slide "A" (Fig. 22) is straight, and at a 90 degree angle with "B". Be sure "C" is parallel to "B", and the prong "D" is at a 90 degree angle with "C". See that the top of the shutter slide lock "E" (old style only) is formed so it projects beyond "B" about the thickness of the metal. Bend the upper end of the lock down until there is a clearance of .110" at "F", between the formed end and long part of the lock. A #34 drill can be used as a gauge for this clearance.

B. With a fine file, go lightly over the inner surface of "B", which rides on the casting. This will remove any rough spots which might cause the slide to bind or score the casting. Do not remove the chrome finish. When the Magazine Shutter Slide Assembly is properly formed, assemble it to the magazine and be sure it slides easily and smoothly.

C. If the two prongs of the Shutter Slide strike the Hinge Section when the slide is moved, file them off just enough to clear the Hinge Section. The long arm "A" of the old style Shutter Slide should incline slightly toward the sprocket at its outer end, as the end of the slide operates the Sprocket Shaft Lock on the old style magazine, and it must have enough tension against the lock to keep it in position. No part of the Shutter Slide should show in the picture aperture when the slide is fully opened.

10. Fit New Magazine Shutter.

The Magazine Shutter #65006 should not be more than 1-17/64" wide. If it is, trim the excess stock from the lower edge, the edge having a rounded corner on the end with the holes. Assemble the shutter to the shutter slide, the lower edge toward the formed end of the shutter slide, with the Magazine Shutter Slide Rivets (3) #80388.

11. Reassemble Magazine Shutter Cover.

A. Curve the Magazine Shutter Cover #65007 down slightly, lengthwise, so it is snug with the magazine when the screws are in place. Assemble the Magazine Shutter Cover to the Magazine with the Magazine Shutter Cover Screws (4) #56570, but not the rivets. See that the Shutter Slide Assembly works smoothly, without too much drag, when the Shutter Cover is in place.

B. When the Shutter Slide is adjusted so it works properly with the Shutter Cover in place, remove the Shutter Cover and put a little black filler along the upper edge of the magazine, where it meets the Shutter Cover. (Be careful not to get so much at the sprocket end that it will be forced out and freeze the old style Sprocket Shaft Lock.) Put the cover in place, assemble the screws, and assemble the Magazine Shutter Cover to Magazine Rivets (4) #78043, using the rivent set (Tool No. 500 EE).

C. When fitting a new Magazine Shutter Cover, remove the light leak yarn from the old cover and cement it to the new one with Vulcolac.

12. Put the Take-up Spool Assembly #73038 into the left end of the magazine, with the slot end toward the top of the magazine, and put the Take-up Spool Core Washer #65174 between the bottom end of the Take-up Spool and the flange in the spool chamber. The washer should be bent just enough to take up the end play between the spool and the casting, but not enough to cause any drag on the spool.

13. A. Put the Take-up Spool Clutch Assembly #73039 into the Take-up Spool Core #65122, and <u>be sure</u> the pins in the Clutch slide in and out of the small slots in the end of the Take-up Spool Core freely. It is important that the

Clutch does not bind in the Core. Put the Clutch and Core through the hole in the upper side of the magazine, and slide it into the Take-up Spool until the groove near the bottom end of the core is close to the bottom end of the slot in the Take-up Spool.

Straighten the curve of the Take-up Spool Tension Spring #85384 lengthwise, to give it more tension, and hook one formed end into the square hole in the groove of the Take-up Spool Core. Turn the Core clockwise, while holding the Take-up Spool stationary, until the Tension Spring is rolled in between the Spool and the Core, and the other end of the Spring drops into the hole in the Core. Hold the ends of the Spring down to the Core and push the Core and Clutch into the Spool, through the washer and the flange on the casting, until the top end of the Core is flush with the top of the casting.

B. The Take-up Spool Tension Spring forms a tension between the core and the spool, which causes the spool to turn with the core and take up the film as it comes from the sprocket. It allows the spool to slip on the core as the film rolls onto the spool and increases in diameter, needing a shorter turn of the spool to take up one frame of film. There must be enough tension in the spring to wind the film snugly on the spool or the film will pile up in the spool chamber and jam.

14. Swing the Take-up Gear Pawl #72125 around, so it is between the casting and the end of the Take-up Spool Core, and put the Take-up Gear Assembly #73037 in place. Be sure it is tight to the casting, with the Pawl back of the Ratchet, and assemble the Take-up Gear Assembly Screws (3) #56734. Be sure the Pawl rides on the Ratchet, and keeps the Winding Gear from turning backward.

15. A. Put the Throwout Lever Assembly #73043 in place with the pin in its left end in the groove in the Sprocket Shaft Clutch, with the left end of the Throwout Lever in the groove in the Take-up Spool Clutch, and the right end in the groove in the Supply Spool Yoke; then assemble the Spool Throwout Lever Screw #65124.

B. When the Rewind Key is lifted for rewinding, the Supply Spool Yoke should raise the right

end of the Throwout Lever, which will move the left end down away from the Take-up Spool, disengaging the Take-up Spool Clutch and the Sprocket Shaft Clutch. This releases both the Sprocket and the Take-up Spool so they will turn backward freely. If the Clutch does not release the Sprocket, it cannot turn backward as the film is rewound, and will tear the film and make it rewind with difficulty.

C. Before the Take-up Spool Clutch is released, the Take-up Spool can be turned backward against the tension of the Take-up Spool Tension Spring, but it will make the film rewind hard. After the Take-up Spool Clutch is released, the Take-up Spool, Core, and Clutch will turn backward freely, allowing the film to rewind easily.

D. Be sure the Throwout Lever works freely, and has no play on the screw. If it binds, it will not swing far enough to disengage the clutches. If there is play in it, it will tip rather than swing, and will not disengage the clutches.

E. When the Throwout Lever is fitted properly, if both clutches do not disengage when the Rewind Key is lifted, bend the right end of the Throwout Lever toward the bottom of the magazine. If the Sprocket Shaft Clutch disengages and the Take-up Spool Clutch does not, bend the left end of the Throwout Lever toward the bottom of the magazine a little. It may be necessary at times to bend both ends down a little to get both clutches to disengage properly.

F. If the ends of the Throwout Lever are bent down too far the clutches will not engage properly when the Rewind Key is folded against the magazine, and the film will not wind properly. If the clutches do not drop into place when the Rewind Key is folded, turn the sprocket and the supply spool a little.

16. Reassemble and Fit Magazine Back.

A. Be sure the Winding Handle Compression Spring #72108 and Winding Handle Return Stop Plate #72103 are in place in the small rectangular hole in the winding handle. The Spring and Plate act as a shock absorber when the Winding Handle is allowed to snap back after winding.

B. Hook one end of the Winding Handle Return Spring #65138 over the stud in the groove of the Winding Bearing Assembly #73030. Hook the other end on the stud in the Winding Handle Assembly #73028 and put the handle in place on the back, with the Spring in the groove of the Bearing, and the groove in the Winding Handle over the projecting lip of the Bearing. Be careful not to dislodge the Compression Spring and Stop Plate.

C. Swing the Winding Gear Pawl #64984, in the Winding Gear Assembly #73029, around so it's curved edge is next to the outer edge of the Gear; then swing the end of the Spring for Winding Gear Pawl #65078 around, and hook it over a tooth of the Gear near the end of the Pawl.

D. Hold the Winding Handle against the back, and turn the inside of the back up; put a drop or two of oil on the back just outside of the Winding Bearing, put the Winding Gear Assembly on the back, put the Winding Handle Ratchet #64981 in place, put a drop of shellac in the screw hole, and assemble the Winding Handle Screw #64980.

E. Swing the Pawl in against the Ratchet, and put the end of the spring into the groove in the back edge of the Pawl. Be sure the Winding Handle works freely, and the return spring returns it all the way.

F. Check the shape of the arms on the Sprocket Shoe #72104 with the sprocket shoe arm gauge (Tool No. 500 D). If they are not shaped properly, shape them to fit the gauge. Assemble the Sprocket Shoe to the back with the Sprocket Shoe Screws (2) #11129, and be sure the free end of it rests on the boss in the end of the back. When fitting a new Sprocket Shoe, be sure it is straight and the arms are properly shaped.

G. To assemble the Pressure Pad Assembly #73033, slip the notch in the end of the Tension Spring under the head of the stud near the Winding Gear and assemble the Film Tension Pad Screw #74111.

H. Pull out the Hinge Pin, put the back in place, and push in the Hinge Pin.

I. Be sure the back opens and closes freely. If it binds, file the casting a little where necessary, but DO NOT file any place where the chrome plating comes up to the edge, as this will make the chrome peel. If the back does not lock tightly, bend the locking points of the back latch down toward the back a little. Be sure the back locks tight to the magazine, especially at the Winding Handle end. If this end of the back does not lock tightly, the winding gears will not mesh properly and will skip, thus damaging the gears.

17. Fit New Plush Light Guards.

If it is necessary to fit any new plush Light Guards -- Magazine to Case Light Guard #78048, Light Guard for Shutter Slide #86607 (old style #65140), or Shutter Light Guard Lower #86608 (old style #81044), the long straight one -- remove the old cement from the metal, and put a coat of Vulcolac on the metal and on the back of the Light Guard. After it has set, put a second coat on the back of the Light Guard, and assemble to the magazine.

18. Fit New Hinge Pin.

If it is necessary to fit a new Hinge Pin #65134, break the tip off of the old one, pull it out, and slide a new one through the Dummy Key Plate into place.

19. Fit Magazine to Kodak.

A. When the magazine is assembled to the Kodak it is very important that it does not touch the Kodak at any point except the four milled bearing surfaces on the front of the casting. Assemble the magazine to the Kodak, screw it down tight, and remove the back.

B. If prong "D" of the Magazine Shutter Slide (see Fig. 22) touches the Case Latch Cover #78086, file the end off until it just clears the Case Latch Cover. Be sure the prong is not short enough to slip over the flange of the Case Latch Cover, and allow the magazine to be removed from the Kodak without first moving the Shutter Slide to the "Unlock" position.

C. With the back off of the magazine, run a .002" feeler between the magazine and the Kodak, along the top, across both ends, and around the Dummy Key Plate and the Rewind Key Plate.

1.) If there is no clearance between the top of the magazine and the Kodak, drill and tap a 4-40 hole in the end of a piece of round drill rod. Remove the magazine, screw the drill rod down on the magazine latch screws, and bend the screws slightly toward the top of the magazine, being very careful not to break the casting.

2.) If there is no clearance between the ends of the magazine and the Kodak, the ends of the Kodak can be bent out a little by pounding them with a fibre or rawhide hammer. Be very careful not to break the casting.

3.) If there is no clearance around the key plates, file down the lower step of the magazine casting. DO NOT file the Kodak to get clearance at these points, as it will cause the chrome to peel.

4.) Check and adjust the focus of the Magazine and Pressure Pad Assembly as described on page 46, No. 27: A, B and C.

Repair Department

EASTMAN KODAK COMPANY
Rochester, New York

250-1143
Printed in United States of America

Kodak Retra

Illumination and Film Wind

Load Camera with 13 exposure roll of Pan. X
Cassette must not bind on supply spool web.
Film must have a positive anchorage in take up spool
Sprocket teeth must engage film perforations
Close and lock magazine back
No bind or catching
Set exposure counter
Counter should not turn backwards
Make the following exposures while holding lens to illuminator

4	set on	1/1[illegible]	at f 4
3	" "	1/500	" f 5.6
3	" "	1/250	" f 8
3	" "	1/1[illegible]0	" f 11
2	" "	1/50	" f 16
2	" "	1/25	" f 22

While making the above, check for the following:
Pulse must vibrate - counter must advance with each exposure - not more than two complete strokes To set shutter and advance film -Winding lever must not trip shutter -winding lever must return to position after each stroke - Exposure button should not operate shutter before the shutter has been completely wound Shutter signal shows red when shutter has been released - red signal is not visible when shutter is wound. Exposure button must not stick down

Rewind the Film

Rewind crank must not bind when being raised or lowered - must rewind smoothly with resistance but no bind

Remove Film

Check magazine film tracks, by advancing sprocket, for film emulsion piling up.

This was not clear.

KODAK EKTRA CON'T

Use direct current illuminator

Per C.W. 4/19/49

No illumination test need be made on speeds below 1/25 second. If all other illumination shots are ok. and the 1/10 second shutter speed is perfect, illumination shot would be alright. If a test were made on speeds below 1/25, the light source would have to be math. cut accordingly.

KODAK EKTRA

TWO ROLL SHOOTING SCHEDULE

FIRST ROLL

EXP	
1.	Horizontal finder
2.	Vertical finder
3.	13' 4"
4.	15'
5.	17' 2 "
6.	Inf-scale
7.	Inf- RF
8.	25' scale
9.	25' R.F. move scale from Inf. to 25'
10.	25' R.F. " " " $3\frac{1}{2}$' to 25'
11.	25' R.F. " " " $3\frac{1}{2}$ to 15'
12.	10' scale
13.	10' R.F. Move scale from Inf. to 10'
14.	6' scale
15.	6' R.F. move scale from $3\frac{1}{2}$ to 6'
16.	$3\frac{1}{2}$' scale
17.	$3\frac{1}{2}$' R.F. — move scale from Inf. to $3\frac{1}{2}$'
18.	15' scale
	Check delayed action tolerance with timer. 8 to 16 seconds.

SECOND ROLL

EXP.			
1-	1/1000	Second	F4
2.	1/1000	"	F4
3.	1/1000	"	F4
4.	1/500	"	F56
5.	1/500	"	F 56
6.	1/500	"	F 56
7.	1/250	"	F 8
8.	1/250	"	F 8
9.	1/250	"	F 8
10.	1/100	"	F 11
11.	1/100	"	F 11
12.	1/100	"	F 11
13.	1/50	"	F 16
14.	1/50	"	F 16
15.	1/50	"	F 16
16.	1/25	"	F 22
17.	1/25	"	F 22
18.	1/25	"	F 22

FIGURE 1

WINDING CURTAIN ROLLER SHAFT ASSEMBLY

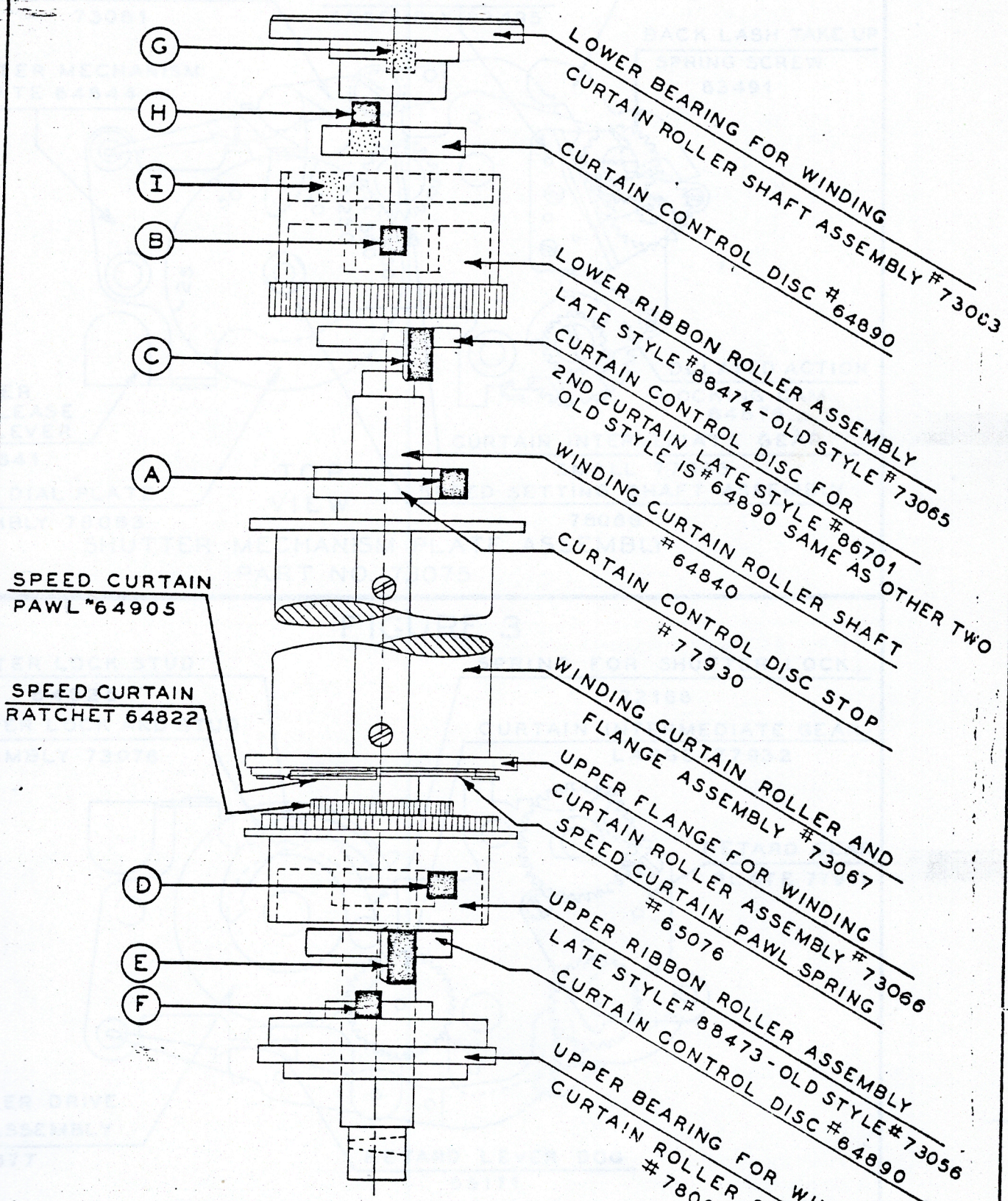
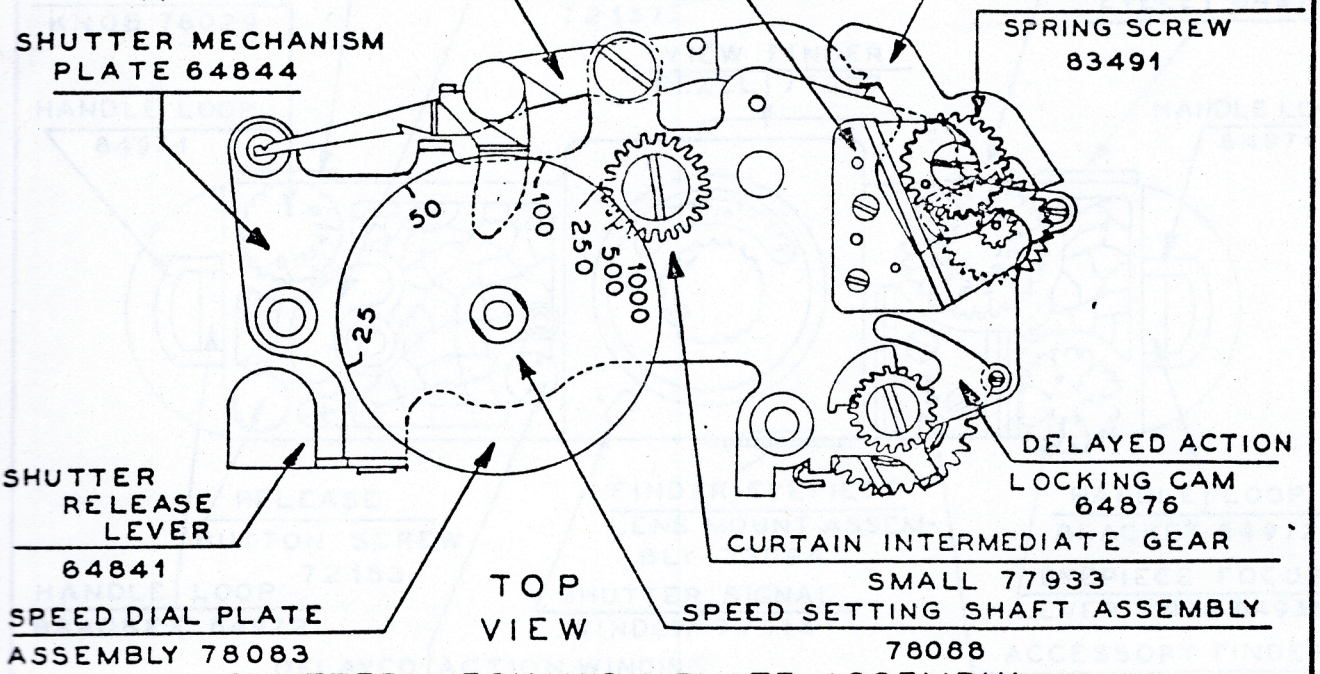
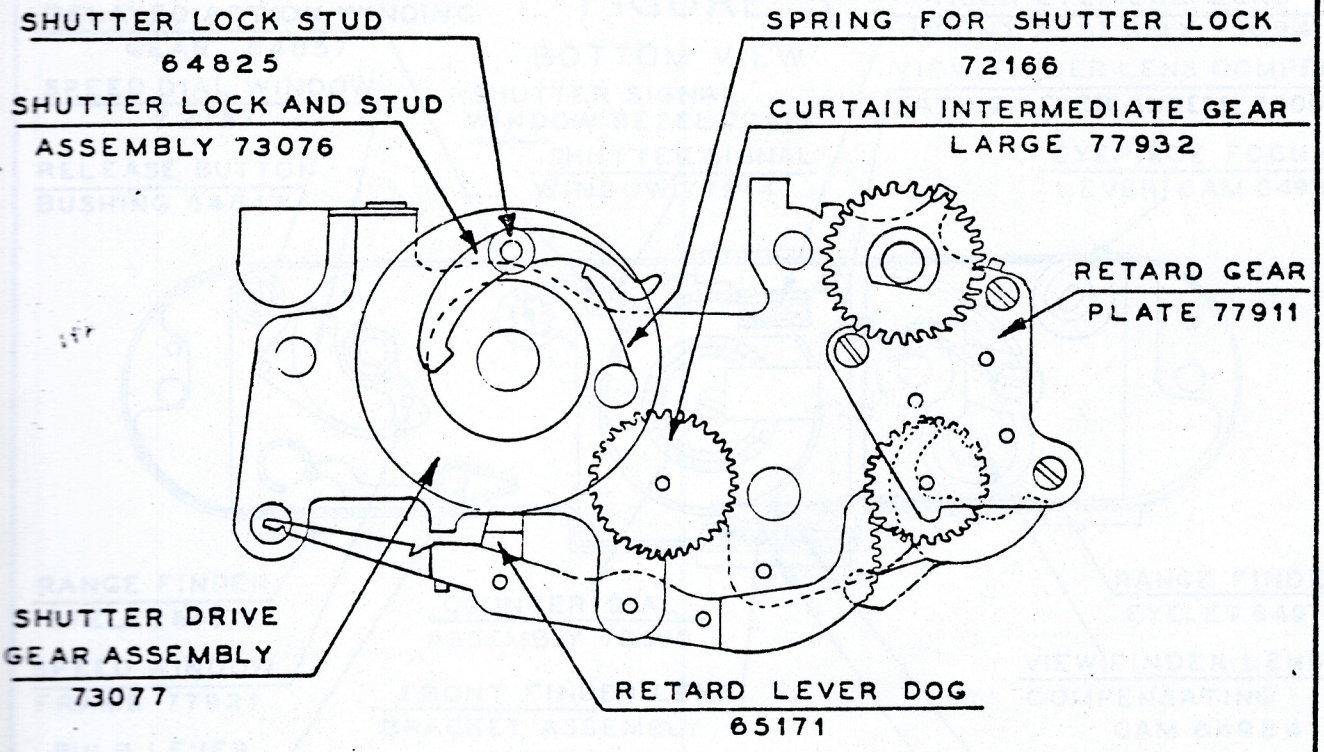


FIGURE 2



SHUTTER MECHANISM PLATE ASSEMBLY
PART NO. 73075

FIGURE 3

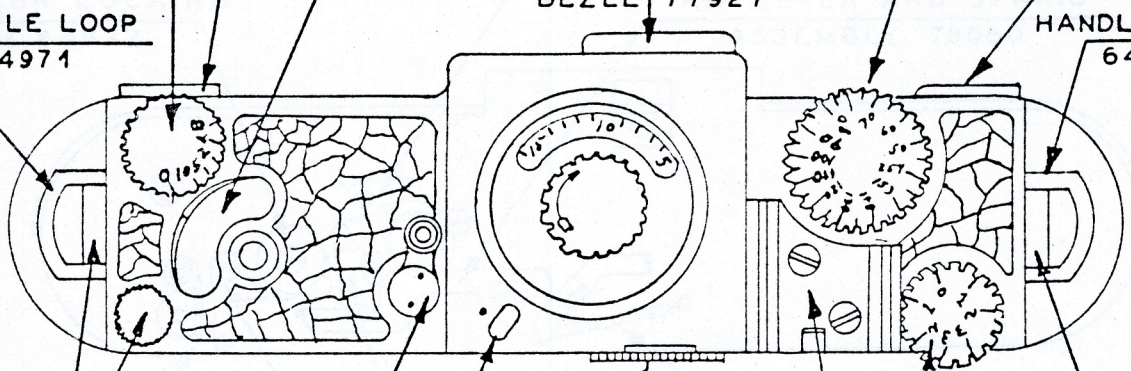


BOTTOM VIEW

SHUTTER MECHANISM PLATE ASSEMBLY
PART NO. 73075

FIGURE 4

TOP VIEW



RANGE FINDER EYELET 64976

RETARD SETTING KNOB 78029

HANDLE LOOP 64971

SPEED DIAL WINDOW 72157

VIEW FINDER BEZEL 77927

VIEW FINDER COMPENSATING LEVER KNOB 64940

RANGE FINDER EYELET 64976

HANDLE LOOP 64971

RELEASE BUTTON SCREW 72153

HANDLE LOOP BRACKET 64972

DELAYED ACTION WINDING LEVER ASSEMBLY 73095

FINDER EYEPIECE LENS MOUNT ASSEMBLY 73094

SHUTTER SIGNAL WINDOW 77914

HANDLE LOOP BRACKET 64972

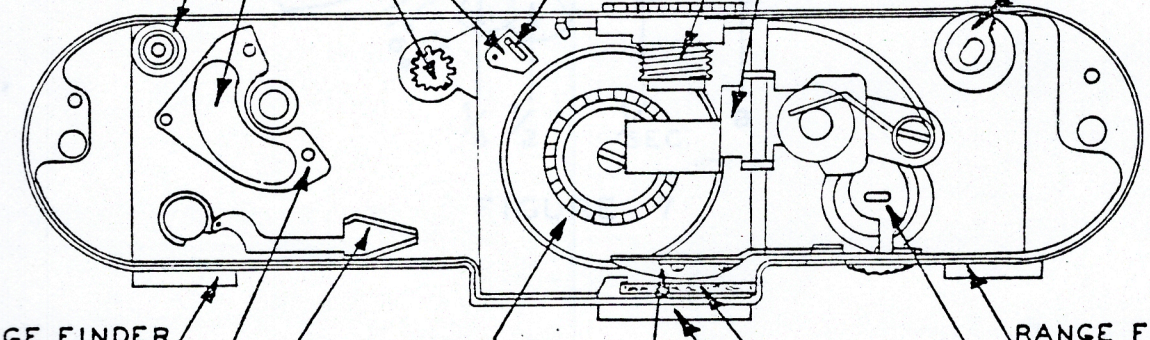
EYEPIECE FOCUS LEVER KNOB 64936

ACCESSORY FINDER BRACKET 78041

RANGE FINDER HOUSING COMPLETE
PART NO. 73096

FIGURE 5

BOTTOM VIEW



DELAYED ACTION WINDING GEAR 64857

SPEED DIAL WINDOW 72157

RELEASE BUTTON BUSHING 64843

SHUTTER SIGNAL WINDOW BEZEL 77915

SHUTTER SIGNAL WINDOW 77914

FINDER EYEPIECE LENS MOUNT ASSEMBLY 73094

VIEW FINDER LENS COMPENSATING LEVER ASSEM. 73092

EYEPIECE FOCUS LEVER CAM 64934

RANGE FINDER EYELET 64976

SPEED WINDOW FRAME 77921

BULB LEVER ASSEMBLY 78089

COUNTER DIAL ASSEMBLY 78090

FRONT FINDER LENS BRACKET ASSEMBLY 73093

VIEW FINDER BEZEL 77927

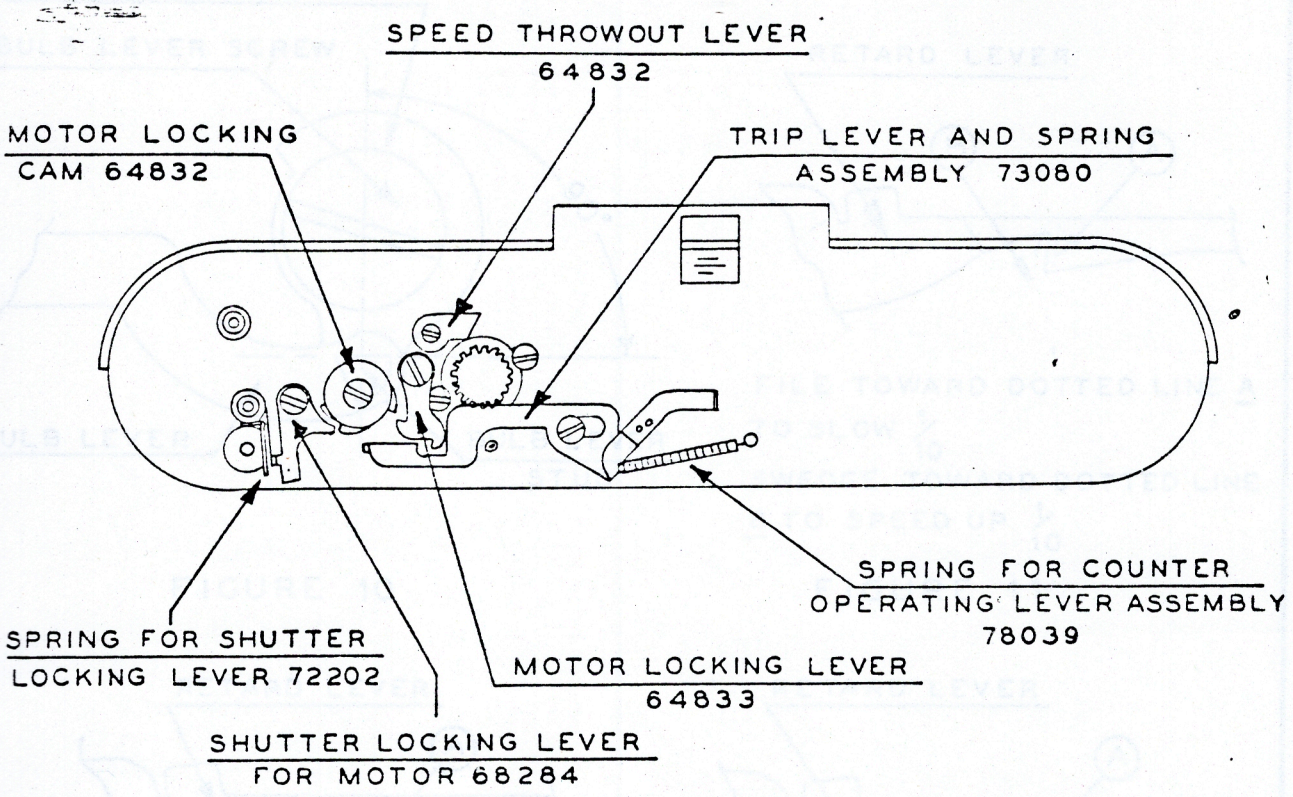
RANGE FINDER EYELET 64976

VIEW FINDER LENS COMPENSATING CAM 64924

VIEW FINDER WINDOW GLASS 65063

RANGE FINDER HOUSING COMPLETE
PART NO. 73096

FIGURE 6



TOP OF CASE

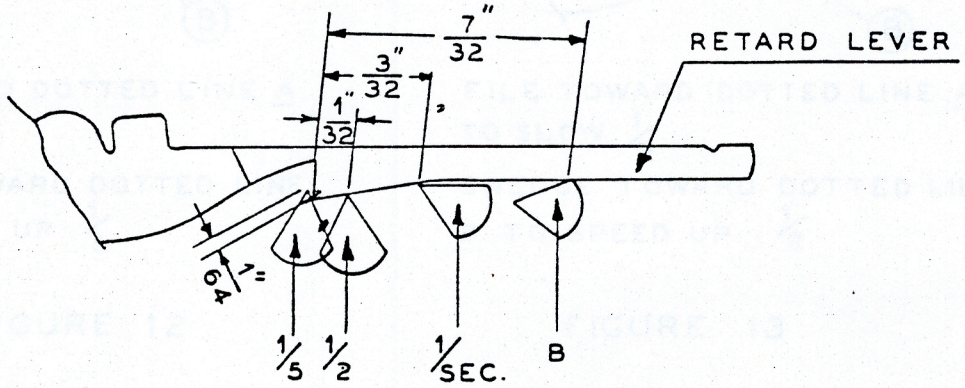


FIGURE 7

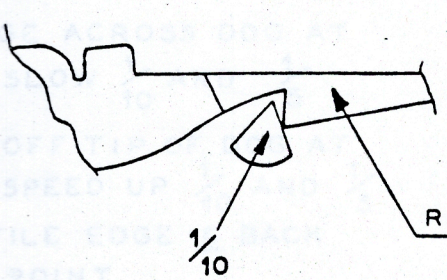


FIGURE 8

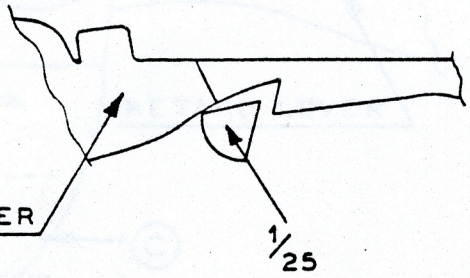


FIGURE 9

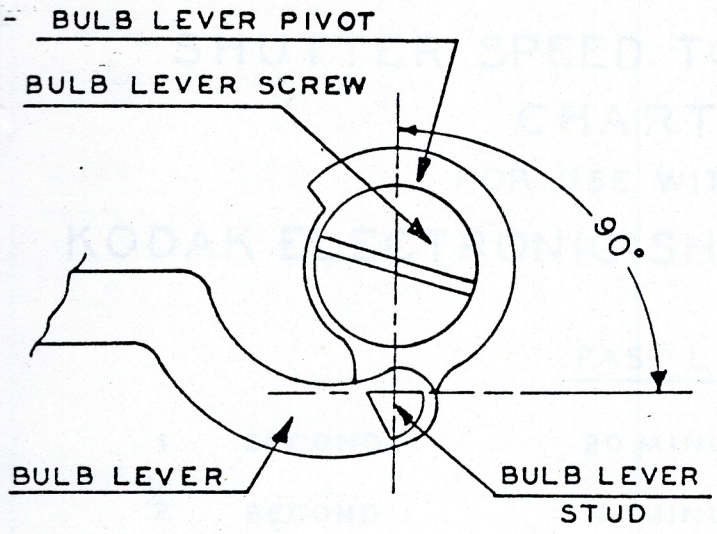
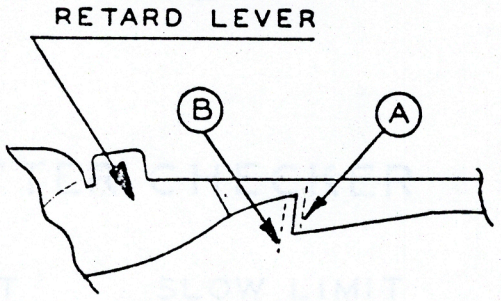
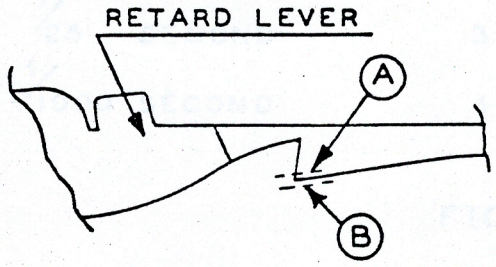


FIGURE 10



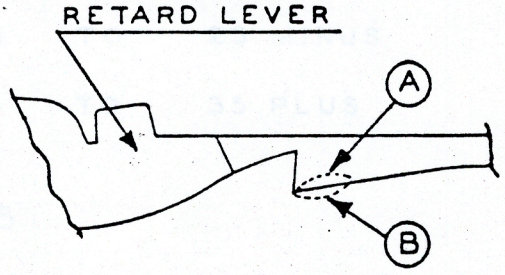
FILE TOWARD DOTTED LINE A TO SLOW 1/10
SWEDGE TOWARD DOTTED LINE B TO SPEED UP 1/10

FIGURE 11



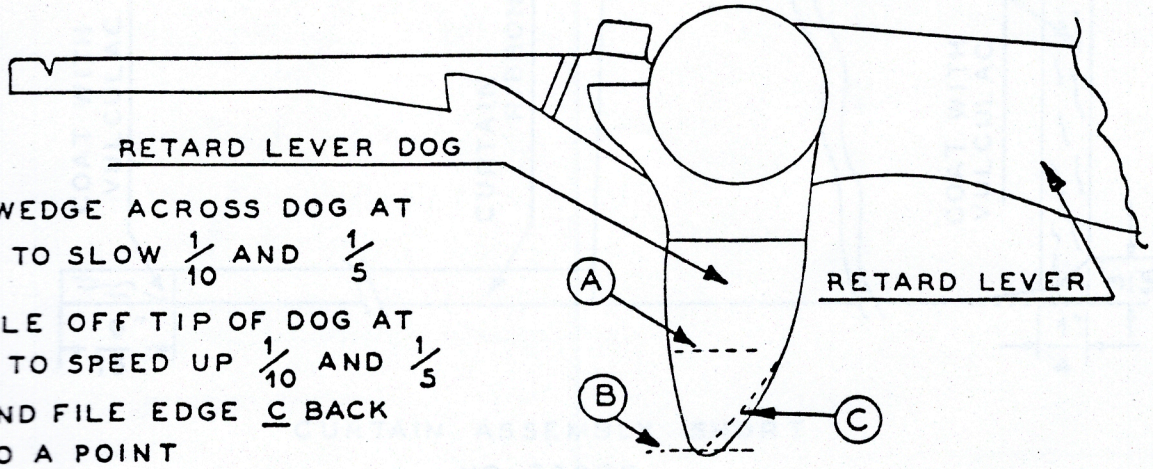
FILE TOWARD DOTTED LINE A TO SLOW 1/5
SWEDGE TOWARD DOTTED LINE B TO SPEED UP 1/5

FIGURE 12



FILE TOWARD DOTTED LINE A TO SLOW 1/2
SWEDGE TOWARD DOTTED LINE B TO SPEED UP 1/2

FIGURE 13



SWEDGE ACROSS DOG AT A TO SLOW 1/10 AND 1/5
FILE OFF TIP OF DOG AT B TO SPEED UP 1/10 AND 1/5 AND FILE EDGE C BACK TO A POINT

FIGURE 14

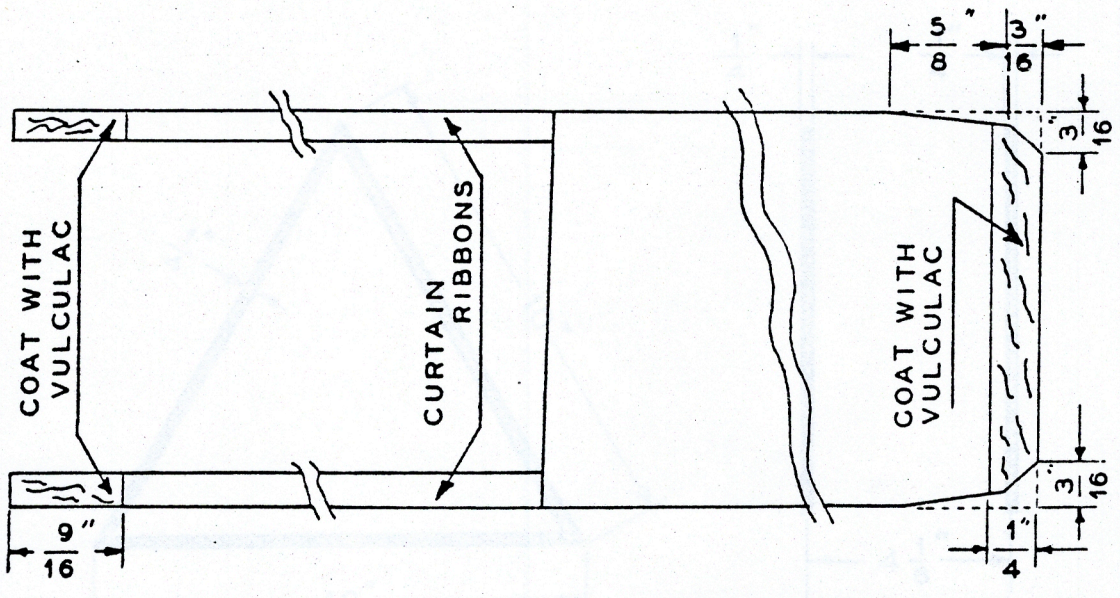
SHUTTER SPEED TOLERANCE CHART

FOR USE WITH

KODAK ELECTRONIC SHUTTER CHECKER

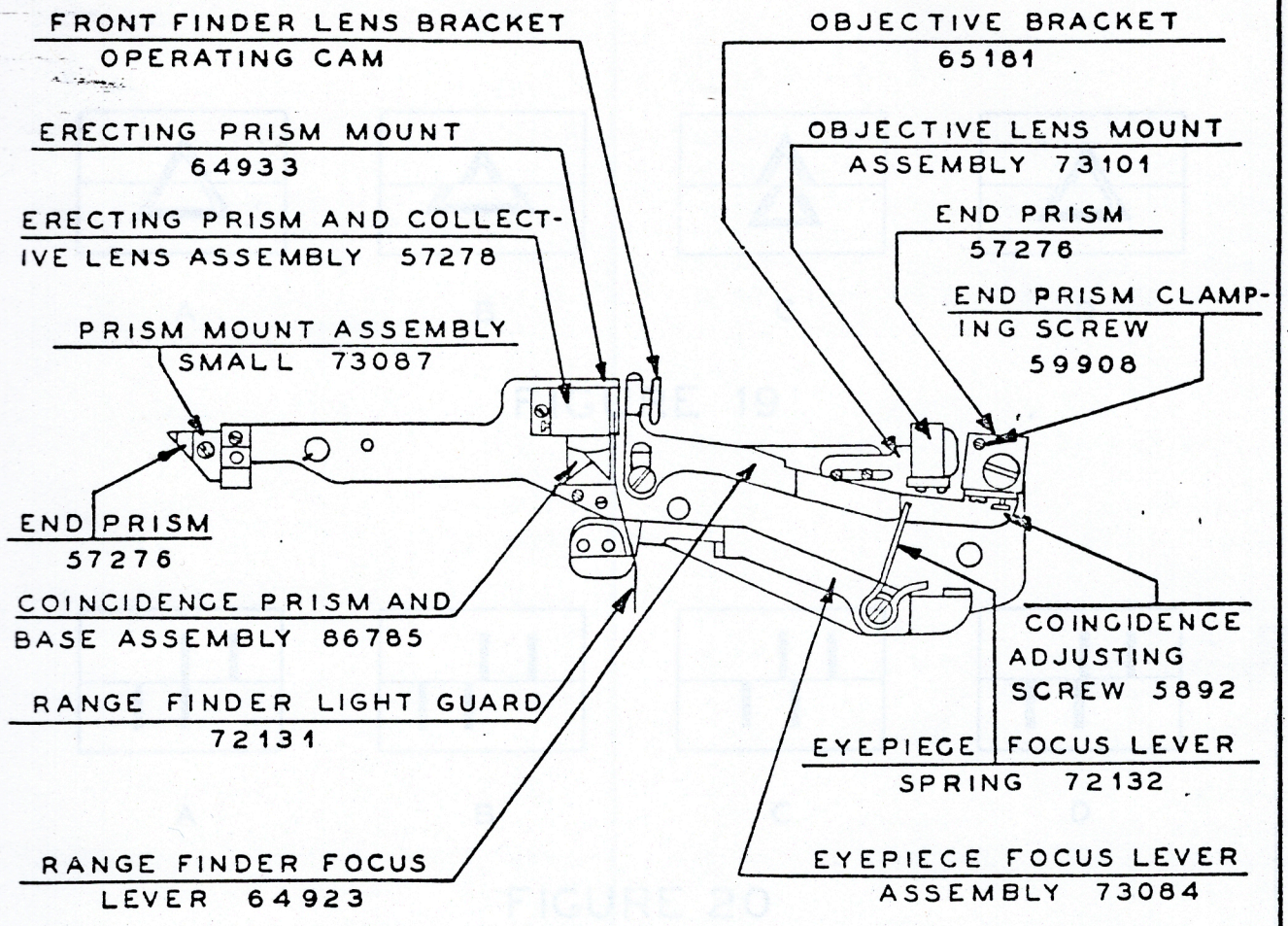
	FAST LIMIT		SLOW LIMIT
1 SECOND	20 MINUS	TO	10 PLUS
1/2 SECOND	15 MINUS	TO	20 PLUS
1/5 SECOND	10 MINUS	TO	50 PLUS
1/10 SECOND	10 MINUS	TO	60 PLUS
1/25 SECOND	35 MINUS	TO	25 MINUS
1/1000 SECOND	10 MINUS	TO	35 PLUS

FIGURE 15



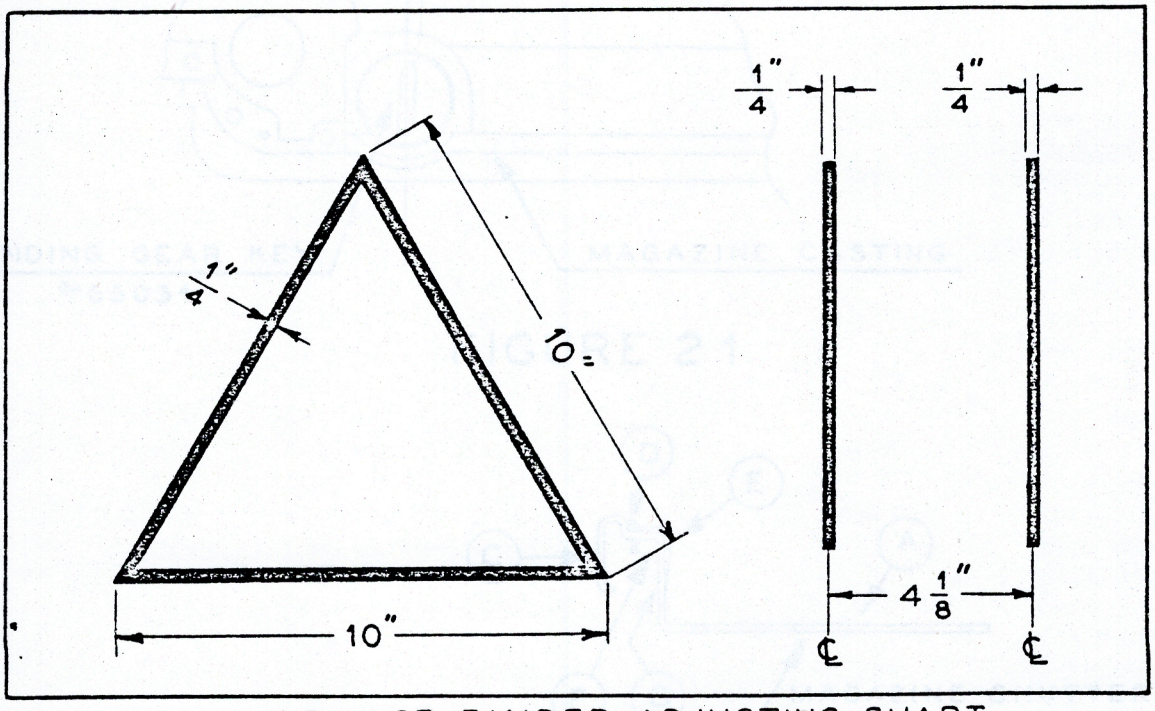
CURTAIN ASSEMBLY SHORT
NO. 73072

FIGURE 16



RANGE FINDER BASE ASSEMBLY COMPLETE
PART NO. 73091

FIGURE 17



RANGE FINDER ADJUSTING CHART

FIGURE 18

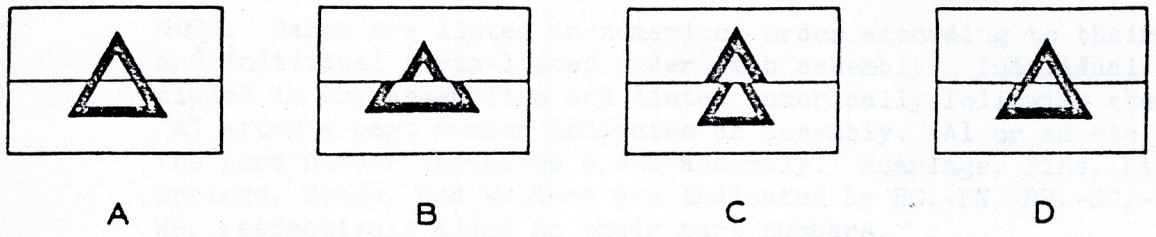


FIGURE 19

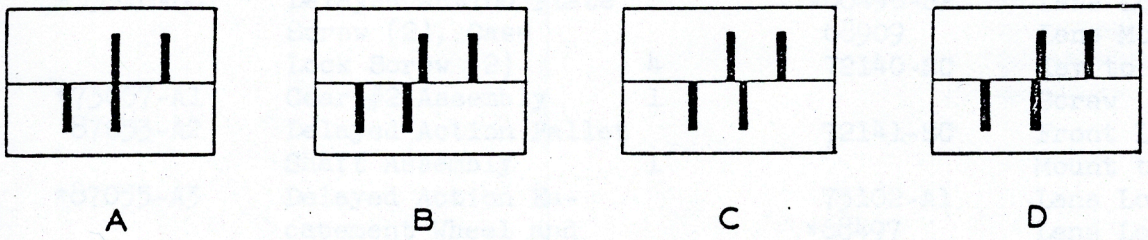


FIGURE 20

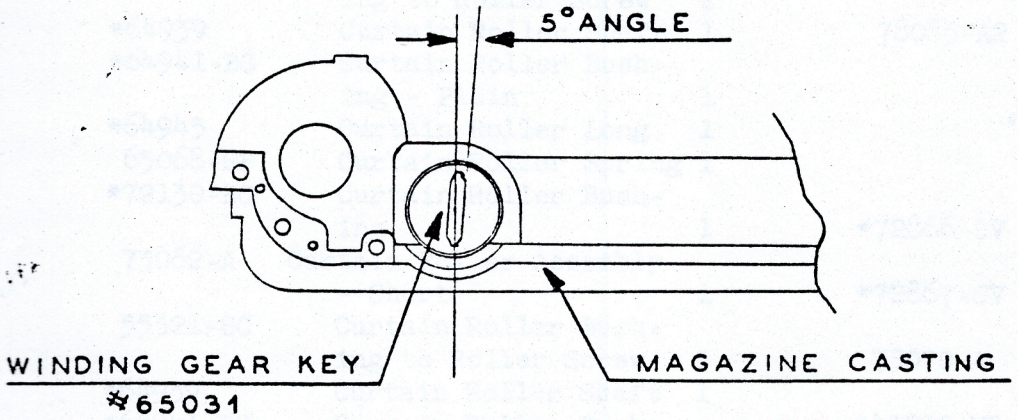


FIGURE 21

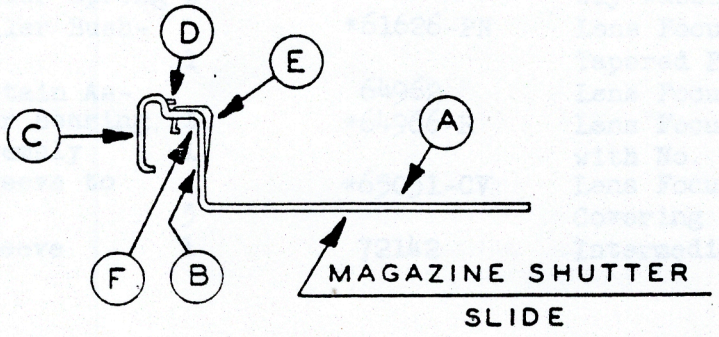


FIGURE 22

KODAK EKTRA

NOTE: Parts are listed in numerical order according to their assemblies and individual parts listed under each assembly. Individual parts not included in any assemblies are listed numerically following the assemblies. "A" after a part number indicates an assembly. A1 or A2 etc. following the part number indicates a sub-assembly. Bearings, Pins, Rivets, Screws, Springs, Studs, and Washers are indicated by BG, -PN, -RV, -SC, -SP, -ST, and WR, respectively added to their part numbers.

PART NO.	NAME OF PART	NO. REQ.
73060-A	Delayed Action Gear Train Assembly Complete	1
*55320-SC	Delayed Action Plate Screw (2), Case Lock Screw (2)	4
*73057-A1	Gear #2 Assembly	1
87053-A2	Delayed Action Pallet Shaft Assembly	1
*87055-A3	Delayed Action Escapement Wheel and #7 Pinion Assembly	1
73061-A	Curtain Roller Assembly - Long	1
55321-SC	Curtain Roller Bushing to Roller Screw	2
*64939	Curtain Roller Shaft	1
*64941-BG	Curtain Roller Bushing - Plain	1
*64945	Curtain Roller Long	1
65068-SP	Curtain Roller Spring	1
*72130-BG	Curtain Roller Bushing	1
73062-A	Curtain Roller Assembly - Short	1
55321-SC	Curtain Roller Bushing to Roller Screw	2
*64939	Curtain Roller Shaft	1
*64941-BG	Curtain Roller Bushing - Plain	1
*64944	Curtain Roller Short	1
65068-SP	Curtain Roller Spring	1
*72130-BG	Curtain Roller Bushing	1
*73063-BG	Winding Curtain Assembly Lower Bearing	1
73069-A	Lens Mount Assembly	1
61311-SC	Focusing Sleeve to Gear Screws	3
64957	Focusing Sleeve	1
64959	Lens Focusing Gear	
64960	Front Lens Stationary Mount	
*68496-SP	Lens Lock Spring	
68909	Lens Mount Key	
72140-SC	Key to Lens Mount Screw	
72141-SC	Front Lens Stationary Mount to Case Screw	
73102-A1	Lens Lock Assembly	
*68497	Lens Lock Knob	
*74112-SC	Tripod Nut Screw	
77928	Front Lens Mount Guard	
*78046-SC	Lens Mount Guard Screw	
78085-A2	Tripod Nut - Whenever ordering a Tripod Nut, please send Camera Serial Number for engraving	
*72866-CV	Tripod Nut Covering - Right	
*72867-CV	Tripod Nut Covering - Left	
73070-A	Lens Focusing Knob Assembly	
*41290-WR	Focusing Knob Assembly Washer (Thin)	
*54772-WR	Focusing Knob Assembly Washer (Thick)	
*61626-PN	Lens Focusing Pinion Tapered Pin	
64962	Lens Focusing Pinion	
*64966-R	Lens Focusing Knob with No. 65051	
*65051-CV	Lens Focusing Knob Covering	
72142	Intermediate Gear	

* PARTS SUPPLIED THAT CANNOT BE INDICATED ON ILLUSTRATIONS.

Always give PART NUMBER AND NAME when ordering parts.

KODAK EKTRA

PART NO.	NAME OF PART	NO. REQ.
	(Lens Focusing)	1
*73071-A	Curtain Assembly - Long	1
*73072-A	Curtain Assembly - Short	1
73073-A	Intermediate Gear	1
*73074-A	Speed Throw-out Lever Assembly	1
73075-A	Shutter Mechanism Plate Assembly	1
63783-SC	Delayed Action Drive Shaft Screw (1), Speed Setting Shaft Screw (1)	2
64841	Shutter Release Lever	1
64848-ST	Shutter Release Lever Stud	1
64876	Delayed Action Locking Cam	1
65081	Gear for Delayed Action Gear Shaft	1
66892-SC	Intermediate Gear Screw	1
*72126	Delayed Action Locking Cam Spacer	1
*72159-BG	Shutting Drive Gear Bearing	1
*72160-BG	Delayed Action Drive Spring Bushing	1
*72197-SP	Delayed Action Motor Spring	1
73058-A1	Delayed Action Drive Gear Assembly	1
73077-A2	Shutter Drive Gear Assembly	1
64825-ST	Shutter Lock Stud	1
72166-SP	Shutter Lock Spring	1
73076-A3	Shutter Lock Stud Assembly	1
78052-ST	Shutter Lock Spring Stud	1
73081-A4	Retard Lever Assembly	1
*64879	Retard Lever	1
*65171	Retard Lever Dog	1
77920-SP	Retard Dog Spring	1
77955-ST	Retard Lever Dog Stud	1
77911	Retard Gear Plate	1
77913-WR	Speed Setting Shaft Washer	1
*77931-BG	Curtain Intermediate Gear Bushing	1
77932	Curtain Intermediate Gear - Large	1
77933	Curtain Intermediate Gear - Small	1
*77934	Retard Gear Plate Spacer	3
77946-ST	Retard Lever Stud	1
*77948-SP	Speed Setting Knob Return Spring	1
*78035-SC	Bracket to Mechanism Plate Screw	2
78079-A5	#2 Pinion Assembly	1
78080-A6	#3 Pinion Assembly for Retard Gear Train	1
78081-A7	Retard Pallet Assembly	1
78083-A8	Speed Dial Plate Assembly	1
78088-A9	Speed Setting Shaft Assembly	1
*78091	Retard Gear Train Assembly #1 Idler Gear	1
83487-SC	Retard Gear Plate Spacer Screw	6
83491-SC	Back Lash Take-up Gear Stud Screw	1
83493-SP	Back Lash Take-up Spring	1
*83494-A10	Back Lash Take-up Gear Assembly	1
83495-A11	Pallet Bracket Assembly	1
*83492-ST	Back Lash Take-up Gear Stud	1
*83496-PN	Pallet Bracket Dowel Pin	2
*87054-A12	Retard Escapement Wheel and #4 Pinion Assembly	1
86696	Shim for #4 Retard Pinion (Thin) No. 86697 for Shim (Thick)	As req.
73079-A	Release Lever Assembly	1
64861	Release Lever	1
64877	Connecting Rod for	

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KODAK EKTRA

PART NO.	NAME OF PART	NO. REQ.
	Release	1
64878	Delayed Action Release	1
*77956-ST	Curtain Release End Stud	1
72185-SC	Delayed Action Release Adjustment Screw	1
72186-SC	Adjusting Tension Washer	1
85385-ST	Release Lever Spring Stud	1
85386-SP	Release Lever Spring L.M. No. 72181 O.S.	1
73080-A	Trip Lever and Spring Assembly	1
*64834	Film Counter Dial Trip Lever	1
*64835-SP	Film Counter Dial Ratchet Spring	1
*81045-RV	Film Counter Dial Ratchet Spring Rivet	2
73091-A	Range Finder Base Assembly	1
* 5892-SC	Erecting Prism Clamping Screw (1), Focusing Lever to Prism Mount Screw (2)	3
*15323-SC	Mount to Base Screw	2
54452-SC	End Prism Large to Bearing Screw	1
*55321-SC	Clamp Screws	2
*57276	End Prism	1
57278-A1	Erecting Prism and Collective Assembly	1
*59871	Prism Shim	2
*59908-SC	End Prism Mount Screw	1
*61871-SC	Erecting Prism Mount Assembly to Base Screw (2), Objective Mount Assembly to Base Screw (2)	4
*64175	Screen for Light Guard	1
64923	Range Finder Focus Lever	1
64925	End Prism Mount - Large	1
64927	End Prism Mount - Small	1
64928-ST	Range Finder Focus Lever Stud	1
*64933	Erecting Prism Mount	1
*72131	Range Finder Light Guard	1
72132-SP	Eye Piece Focus Lever Spring	1
73084-A2	Eye Piece Focus Lever Assembly	1
*62888-RV	Delayed Action to Release Rivet	2
*65154	Eye Piece Lens	1
*87242	Eye Piece Lens Mount	1
73086-A3	Objective Bracket Assembly	1
*61871-SC	Objective Mount to Bracket Screw	2
*73101-A4	Objective Mount Assembly	1
73087-A5	Prism Mount (Small) Assembly	1
*57276	End Prism	1
*59871	Shim for Prism	1
*59908-SC	End Prism Mount Screw	1
*64926	End Prism Mount Small	1
*65153	Objective Lens	1
*74110	Spacing Ring for End Prism	1
*77929	Range Finder Diaphragm	1
81051-ST	Focus Lever to Range Finder Base Stud	1
*86695-SC	Erecting Prism Set Screw	2
*86785-A6	Coincidence Prism and Base Assembly	1
*64953	Erecting Prism Mount Base	1
*65152-A7	Coincidence Prism Assembly	1
88912-SC	Coincidence Adjusting Screw	1
73096-A	Range Finder Housing Complete	1
*19240-PN	Range Finder Housing Pin	2
56771-SC	Accessory Finder Bracket to Case Screw	2
64842	Release Button	1

* PARTS SUPPLIED THAT CANNOT BE INDICATED ON ILLUSTRATIONS.

Always give PART NUMBER AND NAME when ordering parts.

KODAK EKTRA

PART NO.	NAME OF PART	NO. REQ.
64857	Delayed Action Winding Gear	1
*64862-SC	Delayed Action Winding Lever Screw	1
*64922-ST	View Finder Compensating Lens Bracket Guide Stud	1
64928-ST	Compensating Lever to Range Finder Housing Stud	1
64948	Finder Eye Piece Lens Mount	1
*64952	Finder Eye Lens Retainer	
65061-SP	View Finder Compensating Lever Spring	1
*65062-ST	Front Finder Lens Bracket Pivot Stud	1
65063	View Finder Window Glass	1
65064	Range Finder Window Glass	2
*65065	Window Glass Eyepiece	1
65098-CV	Range Finder Housing (Left Hand) Covering	1
*65157	Eye Lens	1
72153-SC	Release Button Plug Screw	1
72156-CV	Range Finder Covering Insert	1
*85381-SC	Range Finder Housing to Case Screw L.M. No. 42929 O.S.	2
*85382	Range Finder Adjusting Hole Cap	1
73085-A1	Range Finder Housing for Covering	1
*64843-BG	Release Button Bushing	1
*64858-BG	Delayed Action Winding Lever Bearing	1
64924	View Finder Lens Compensating Cam	1
64936	Eyepiece Focus Lever Knob	1
64940	View Finder Compensating Lever Knob	1
64971	Handle Loop	2
64972	Bracket for Handle Loop	2
72145-WR	View Finder Compensating Knob Friction Washer	1
*72146-WR	View Finder Compensating Lever Knob Washer	1
*72149-WR	Eyepiece Focus Lever Cam Washer	1
*72150-WR	Eyepiece Focus Lever Cam (Spring) Washer	1
72157	Speed Dial Window	1
*77914	Shutter Signal Window	1
77915	Shutter Signal Window Bezel	1
77927	View Finder Bezel	1
*78031-BG	Speed Setting Knob Bearing	1
*78032-ST	Focal Plane Identification Stud	1
*78036-RV	Speed Dial Window Rivet	3
87174	Eyepiece Focus Lever Cam	1
73092-A2	View Finder Lens Compensating Lever Assembly	1
*64921	View Finder Lens Compensating Lever	1
*64929-ST	View Finder Compensating Lever Stud - Short	1
*64932	View Finder Compensating Lens Bracket	1
64954	Negative Lens Bracket	1
64956-ST	View Finder Compensating Lens Bracket Stud	1
*65156	Negative Finder Lens	2
*72147	Negative Lens Retainer	1
*72148-WR	View Finder Compensating Lens Bracket Spring Washer	1
*78051-RV	Lens Bracket to Bracket Rivet	2
73093-A3	Front Finder Lens	

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KODAK EKTRA

PART NO.	NAME OF PART	NO. REQ.
	Bracket Assembly	1
*49291-SC	Basket to Bracket Screw	2
64289-SC	Front Finder Lens Bracket to Spring Screw	1
*64935	Front Finder Lens Bracket	1
*65155	Positive Finder Lens	1
*72151-SP	Front Finder Lens Bracket Spring	1
*73095-A4	Delayed Winding Action Lever Assembly	1
*80389	Delayed Action Winding Lever Knob	1
*77917-WR	Retard Setting Knob Washer - Thin	As req.
78029	Retard Setting Knob	1
78030-SC	Bulb Lever Pivot Knob Screw	1
78041	Accessory Finder Bracket	1
*78042-SP	Accessory Finder Bracket Spring	1
78089-A	Bulb Lever Assembly	1
*79831-ST	View Finder Compensating Lever Stud - Long	1
81046-WR	Release Button Screw Tension Washer	1
*81047	View Finder Mask	1
81052-CV	Range Finder Housing (Right Hand) Covering	1
*83497-WR	Eye Lens Retaining Washer	1
*83866-WR	Retard Setting Knob Tension Washer - Medium	As req.
*83867-WR	Retard Setting Knob Tension Washer - Thick	As req.
*83871-WR	Release Button Washer	1
88909-A5	Range Finder Eyelet Assembly - Right Hand	1
*81049	Range Finder Window Gasket	4
88910-A	Range Finder Eyelet Assembly - Left Hand	1
*81049	Range Finder Window Gasket	4
*73097-A	Camera Case Assembly with Covering	1
*64836-BG	Main Drive Bearing	1
*64838	Spacing Post	2
*64897-BG	Speed Throwout Lever Shaft Bearing	1
*65014	Intermediate Gear Shaft	1
65096-CV	Case Front (Left Hand) Covering	1
*65158	Retard Stop Lever Post	1
68450-CV	Case Front (Right Hand) Covering	1
69364	Magazine Latch Knob	2
*69365-WR	Magazine Latch Knob Washer	2
*72182-BG	Shutter Release Lever Adjusting Screw Bushing	1
78086-A	Case Latch Cover Covered	1
*65097-CV	Case Latch Cover~~ed~~	1
78087-A	Speed Setting Knob Assembly	1
78090-A	Counter Dial Assembly	1
*64845	Counter Dial Eyelet	1
64846	Counter Dial Knob	1
*64847	Film Counter Dial	1
66892-SC	Friction Washer to Knob Screw	1
*78045-WR	Counter Dial Knob Friction Washer	1
*78092-BG	Window Curtain Assembly Upper Bearing	1
*77910-PN	Upper Bearing Stop Pin	1
*87531-A	Neck Strap Assembly	1
*80817-ST	Neck Strap Assembly Stud	2
88472-A	Winding Curtain Roller Shaft Assembly L.M. - No. 73068 O.S.	1
*55167-SC	Winding Curtain Roller to Shaft Screw	2
55321-SC	Curtain Clamp Screw	

* PARTS SUPPLIED THAT CANNOT BE INDICATED ON ILLUSTRATIONS.

Always give PART NUMBER AND NAME when ordering parts.

KODAK EKTRA

PART NO.	NAME OF PART	NO. REQ.
	- Long	1
*64840	Winding Curtain Roller Shaft	1
*64890	Curtain Control Disc	2
68873	Winding Curtain Clamp	1
*68893-WR	Curtain Control Disc Stop Washer	1
64896	Curtain Winding Gear	1
*72134-PN	Curtain Control Disc Stop Pin	1
*73049-SC	Curtain Clamp Screw - Short	2
73066-A1	Winding Curtain Roller Assembly Upper Flange	1
*64905	Speed Curtain Pawl	1
*64912-ST	Speed Curtain Pawl Stud	1
64949	Curtain Roller Spacer - Upper	1
*65076-SP	Speed Curtain Pawl Springs	1
*67288	Winding Curtain Roller Upper Flange	1
*78047-ST	Speed Curtain Pawl Spring Stud	1
*73067-A2	Winding Curtain Roller and Flange Assembly	1
*77916-SP	Ribbon Roller Take-up Spring O.S.	1
*77923-SP	Clutch Spring	1
*77930	Curtain Control Disc Stop	1
*78038-PN	Winding Gear Tapered Pin	1
*86701	Second Curtain Control Disc	1
88473-A3	Curtain Ribbon Upper Assembly Roller L.M. - No. 73056 O.S.	1
*64822	Speed Curtain Ratchet	1
*68868-PN	Ribbon Roller Stop Pin	1
*87586	Curtain Roller Gear Upper	1
88474-A4	Curtain Ribbon Lower Assembly Roller L.M. - No. 73065 O.S.	1

CAMERA CASE COMPLETE

All parts listed below are not listed under any assemblies. These parts are fitted to camera case complete.

PART NO.	NAME OF PART	NO. REQ.
*10363-SC	Delay Action Assembly to Case Screw	2
*15259-SC	Mechanism Plate Assembly to Case Assembly Screw	2
*18402-SC	Light Guard Screw	1
*43004-WR	Throwout Lever Washer	as req.
*55320-SC	Case Lock Screw	2
56561-SC	Motor Locking Case Screw	1
*57235-SC	Upper Bearing Screw	2
*58729-SC	Range Finder Base to Case Screw	2
*59044-SC	Intermediate Winding Gear Screw	1
63783-SC	Speed Throwout Lever Screw	1
64830	Speed Throwout Lever	1
64832	Motor Locking Cam	1
64833	Motor Locking Lever	1
*64890	Curtain Roller Disc	2
64942	Curtain Roller Spacer - Lower	1
*64943	Curtain Shaft Retainer	1
*64950-BG	Curtain Roller Shaft Bushing	2
*64968-ST	Intermediate Gear Stud	1
*64984	Winding Gear Pawl	1
65013	Case Shutter Cover	1
*68191-SC	Curtain Release Screw (2nd curtain)	1
*66892-SC	Curtain Shaft Retainer Screw	1
68284	Shutter Locking Lever for Motor	1
72141-SC	Front Lens Stationary Mount Screw to Case	4
*72143-SP	Main Shaft Ratchet	

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KODAK EKTRA

PART NO.	NAME OF PART	NO. REQ.
	Pawl Spring	1
72152	Eyepiece Light Guard	1
*72158-SP	Speed Curtain Release Spring	1
*72177-SC	Speed Setting Knob Screw	1
*72183-SC	Shutter Release Lever Adjusting Screw	1
*72184-SC	Set Screw for Adjusting Release Lever Screw	1
72201	Spacing Post for Sleeve - Long	1
*72202-SP	Shutter Locking Lever Spring	1
77925-ST	Counter Operating Lever Spring Stud	1
*77945-SP	Retard Lever Spring	1
*77947-ST	Retard Lever Spring Stud	1
*78034	Upper Ratchet for Speed Setting	1
78039-SP	Counter Operating Lever Assembly Spring	1
78050-SC	Lower Bearing Screw	2
*79025-SC	Range Finder Base to Case Screw	1
81050-SC	Case Shutter Cover to Case Screw	6
*85387-ST	Release Lever Stud	1
86692-SC	Motor Locking Lever Screw (1), Trip Lever Screw (1), Shutter Locking Lever (1) L.M.; No. 64849 - O.S.	3
*86693-SC	Winding Lever Pawl Screw	1
87509	Main Drive Shaft and Ratchet Assembly	1
87587	Curtain Roller Idler Shaft	1
*87588-SC	Idler Gear Pivot Screw	1

MAGAZINE PARTS

All parts listed below are used on Magazine complete.

PART NO.	NAME OF PART	NO. REQ.
65100-R	Magazine with Lower Light Guard No. 88911-L.M., No. 81044-O.S. Magazine to Case Light Guard No. 78048, Back Latch Stud No. 65141-ST, Shutter Shaft Bearing - Upper No. 64998 and Latch Stud Long No. 69367-ST, No. 69367-ST Short	1
*11657-PN	Magazine Dowel Pin	2
*64998-BG	Sprocket Shaft Bearing Upper	1
*61311-SC	Hinge Section to Magazine Screw (Long)	2
56570-SC	Magazine Lock Plate Screw (4) Magazine Shutter Cover Screw (4)	8
*56734-SC	Take-up Gear Assembly Screw	3
65007	Magazine Shutter Cover	1
65111	Dummy Key Plate	1
*65122	Take-up Spool Core	1
65124-SC	Spool Throwout Lever Screw	1
*65126-BG	Sprocket Shaft Bearing Lower	1
65134-PN	Hinge Pin	1
65141-ST	Back Latch Lock Stud	2
*65148	Magazine Lock Plate	1
*65174-WR	Take-up Spool Core Washer	1
69366-SC	Magazine Latch Screw - Long	1
69367-SC	Magazine Latch Screw - Short	1
*72117-SC	Key Plate to Magazine Screw	4
*72123-SP	Magazine Ratchet Pawl Spring	1
*72125	Take-up Gear Pawl	1

* PARTS SUPPLIED THAT CANNOT BE INDICATED ON ILLUSTRATIONS.

Always give PART NUMBER AND NAME when ordering parts.

KODAK EKTRA

PART NO.	NAME OF PART	NO. REQ.
73036-A1	Rewind Crank Assembly	1
*55321-SC	Locking Plate to Key Collar Screw	2
*65101	Rewind Key Plate	1
*65102	Winding Key	1
*65103	Key Collar	1
65108	Rewind Key Knob	1
65109-SC	Rewind Key Knob Screw	1
65110	Supply Spool Hub Yoke	1
*65145-PN	Rewind Key Pin	1
*66892-SC	Key Web Screw	1
*72110-SP	Rewind Key Spring	1
*83498-SP	Rewind Key Web Spring	1
83499	Rewind Key Web	1
*83500	Rewind Key Shaft	1
*72112-BG	Rewind Key Shaft Bearing	1
*72113-WR	Rewind Key Web Washer	1
*72114-PN	Rewind Key Pin	1
*72115	Rewind Key Shaft Sleeve	1
*72116	Locking Plate for Key Collar	1
73037-A2	Take-up Gear Assembly	1
*80391-PN	Take-up Winding Gear Pin	1
*65011	Key Plate	1
*65118-ST	Take-up Winding Gear Stud	1
*65119	Key Clutch	1
*65120	Take-up Winding Gear	1
*83501	Key Plate for Extra Back	as req.
73038-A3	Take-up Spool Assembly	1
73039-A4	Take-up Spool Clutch Assembly	1
*72118-PN	Take-up Spool Clutch Pin	1
73040-A5	Sprocket Sleeve Assembly	1
73043-A6	Throwout Lever Assembly	1
*65162-ST	Sprocket Clutch Throwout Stud	1
73046-A7	Shutter Slide Guard Assembly	1
73103-A8	Magazine Counter Dial Assembly	1
*60284-WR	Counter Dial Washer	1
*61871-SC	Lock Washer Screw	1
*64862-SC	Counter Dial Screw	1
*65112-SP	Magazine Counter Dial Spring	1
*65176-WR	Hinge Pin Lock Washer	1
*73044-A	Magazine Counter Dial and Pin Assembly	1
*73045-A	Hinge Pin and Lock Plate Assembly	1
*78040	Light Guard Strip for Top of Magazine to Case	1
78043-RV	Magazine Shutter Cover to Magazine Rivet	4
78048	Magazine to Case Light Guard	1
*85384-SP	Take-up Spool Tension Spring	1
*86603	Lock for Support Shaft	1
*86604-SP	Sprocket Shaft Lock Spring	1
*86605-SC	Sprocket Shaft Lock Spring Screw	2
*86606	Sprocket Clutch	1
86607	Light Guard for Shutter Slide	1
*86694-SC	Magazine Pawl Screw L.M., No. 72164 O.S.	1
87004	Hinge Section	1
*87005	Magazine Shutter Slide Lock	1
*87006	Magazine Shutter Slide Lock Plunger	1
*87007-SP	Magazine Shutter Slide Plunger Spring	1
87295-A9	Sprocket and Shaft Assembly	1
*87294-A	Winding Gear Assembly	1
*87580	Magazine Leak Light	

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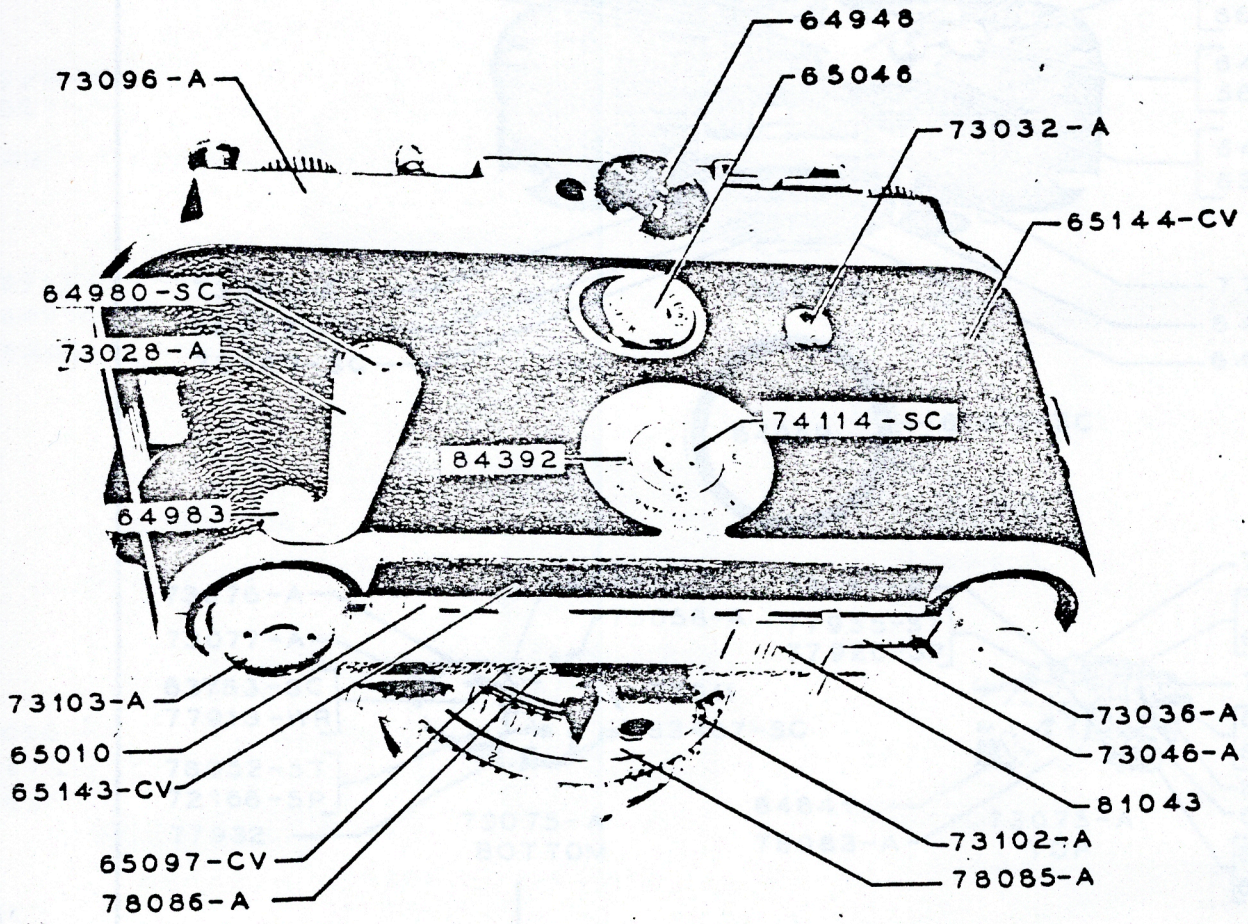
KODAK EKTRA

PART NO.	NAME OF PART	NO. REQ.
	Yarn	1
88228-A10	Magazine Shutter Slide Assembly L.M., No. 73047 - O.S.	1
*65005	Magazine Shutter Slide Clamp	1
*65006	Magazine Shutter	1
*80388-RV	Magazine Shutter Slide Rivet	1
*81043	Magazine Shutter Slide Knob	1
*87003	Magazine Shutter Slide	1
88911	Light Guard for Magazine Shutter Slide-Lower L.M., No. 81044 O.S.	1
73105-A	Back Complete Assembly	1
*11129-SC	Sprocket Shoe Screw	2
*60212-SC	Origin Plate Screw	2
64980-SC	Winding Handle Screw	1
*64981	Winding Handle Ratchet	1
*65138-SP	Winding Handle Spring	1
65143-CV	Back Panel Covering	1
65144-CV	Covering for Back	1
*72103	Winding Handle Return Stop Plate	1
72104	Sprocket Shoe	1
*72108-SP	Winding Handle Compression Spring	1
73028-A1	Winding Handle Assembly	1
64983	Winding Handle Button	1
*65043-ST	Winding Handle Return Spring Stud - Long	1
73029-A	Winding Gear Assembly	1
*64984	Winding Gear Pawl	1
*72101-ST	Winding Gear Pawl Stud	2
73033-A	Pressure Pad Assembly	1
*73034-A2	Back for Covering	1
*30665-RV	Back Light Guard Rivet	4
*21725-RV	Back Hinge Section Rivet	3
*45377-RV	Pulse Spring Assembly Rivet	2
*45795-RV	Hand Winding Gear Bearing Rivet	4
*56677-WR	Tension Washer	1
64985	Back Latch	1
65010	Hinge Section for Back	1
65046	Back Latch Knob	1
72105-ST	Back Latch Stud - Large	2
72106-ST	Back Latch Stud - Small	1
72107	Back Light Guard	1
*72109-ST	Back Latch Stud	1
*73030-A	Winding Bearing Assembly	1
*65044-ST	Winding Handle Return Spring Stud - Short	1
*73031-A	Pulse Spring Assembly	1
73032-A	Pulse Assembly	1
*78044-ST	Film Pressure Pad to Back Stud	1
*87579-WR	Back Latch Leak Light Washer	1
*65078-SP	Forewinding Gear Pawl Spring	1
74111-SC	Film Tension Pad Screw	1
*81789	Origin Plate	1
84392	Film Indicator	1

* PARTS SUPPLIED THAT CANNOT BE INDICATED ON ILLUSTRATIONS.

Always give PART NUMBER AND NAME when ordering parts.

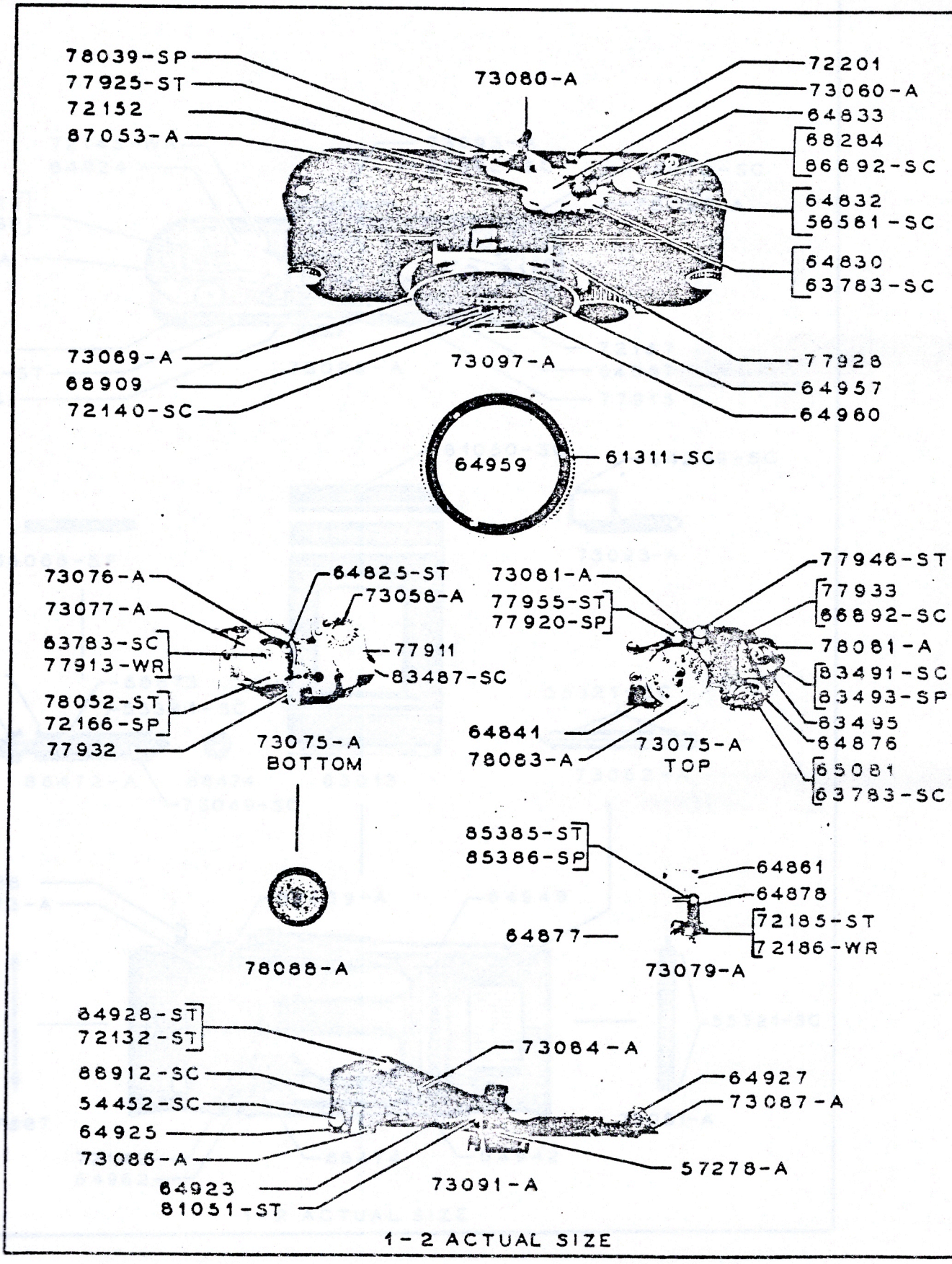
KODAK EKTRA



1-2 ACTUAL SIZE

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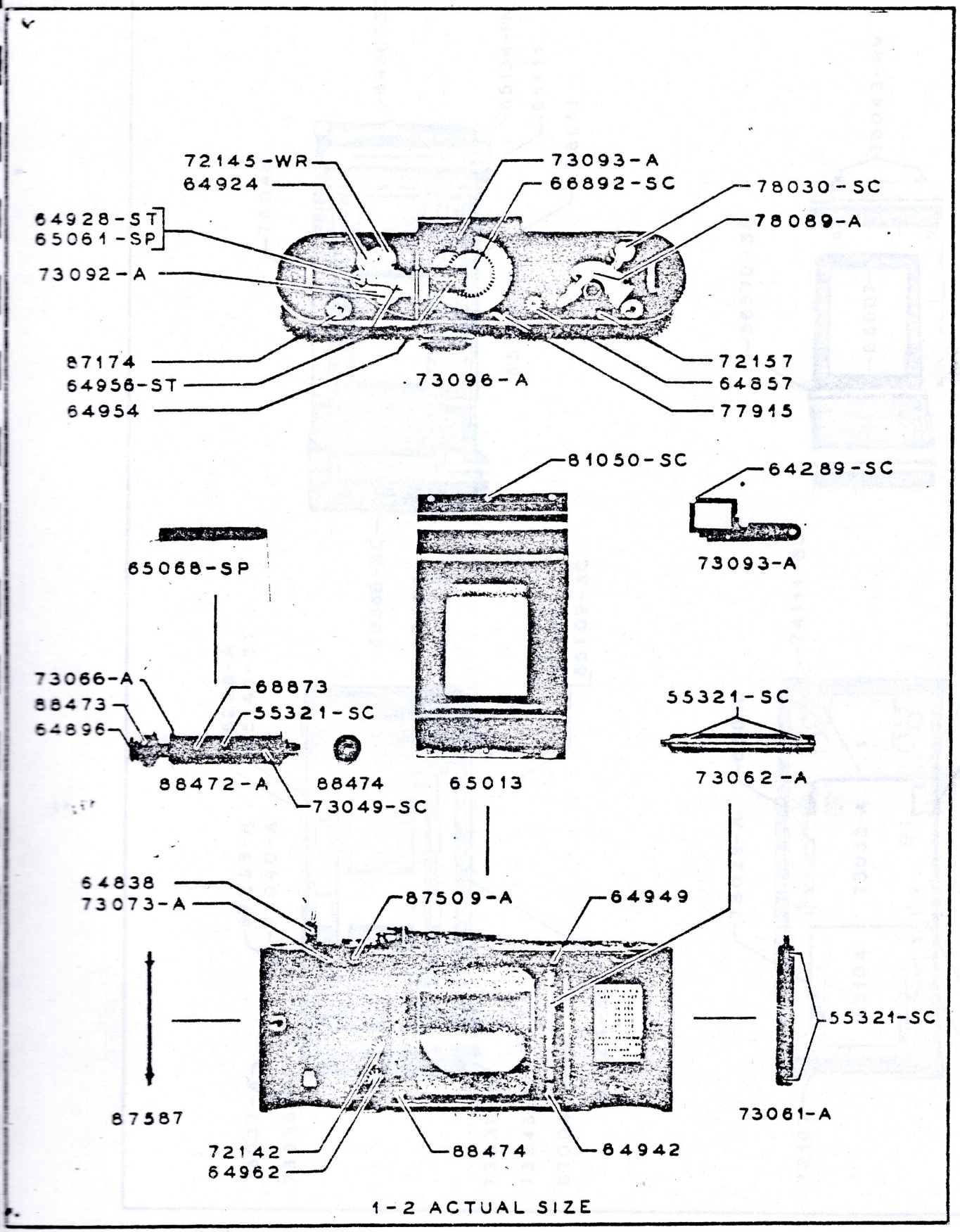
KODAK EKTRA



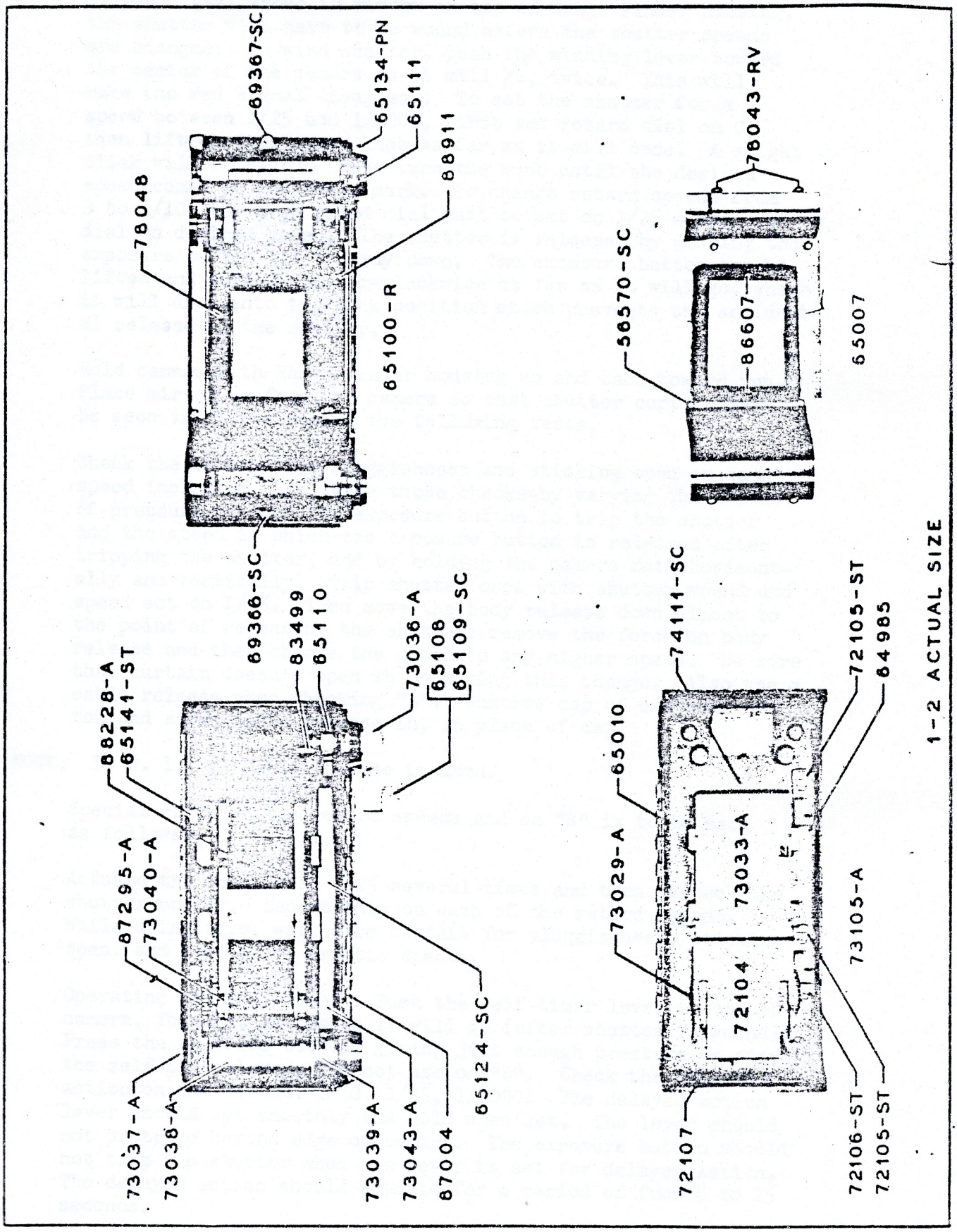
1-2 ACTUAL SIZE

* PARTS SUPPLIED THAT CANNOT BE INDICATED ON ILLUSTRATIONS.

KODAK EKTRA


72145-WR
64924
73093-A
66892-SC
78030-SC
78089-A
64928-ST
65061-SP
73092-A
87174
64956-ST
64954
73096-A
72157
64857
77915
81050-SC
64289-SC
65068-SP
73093-A
73066-A
88473
64896
68873
55321-SC
88472-A
88474
73049-SC
65013
55321-SC
73062-A
64838
73073-A
87509-A
64949
87587
55321-SC
73061-A
72142
64962
88474
64942
1-2 ACTUAL SIZE

KODAK EKTRA



* PARTS SUPPLIED THAT CANNOT BE INDICATED ON ILLUSTRATIONS.

Always give PART NUMBER AND NAME when ordering parts.

Inspection Specifications for the Kodak Ektra. This is to supplement the Inspection Data Sheet.

I Shutter Check

If red signal shows in window on top of Range Finder housing, the shutter will have to be wound before the shutter speeds are changed. To wind shutter, push the winding lever toward the center of the camera as it will go, twice. This will make the red signal disappear. To set the shutter for a speed between 1/25 and 1/1000, first set retard dial on C, then lift shutter speed knob as far as it will come. A slight click will be heard. Then turn the knob until the desired speed comes to the index mark. To change retard speeds from B to 1/10, the high speed dial must be set on 1/25 - then set dial on desired speed. The shutter is released by pushing the exposure button all the way down. The exposure button can be lifted and turned counter-clockwise as far as it will go, where it will drop into the lock position which prevents the accidental release of the shutter.

Hold camera with Range Finder housing up and back toward you. Place mirror in front of camera so that shutter curtain may be seen in mirror during the following tests.

Check the curtain for sluggishness and sticking open on each speed including "B". Make these checks-by varying the amount of pressure used on the exposure button to trip the shutter and the speed in which the exposure button is released after tripping the shutter, and by holding the camera both horizontally and vertically. Trip shutter once with shutter wound and speed set on 1/25. Then move the body release down almost to the point of releasing the shutter; remove the force on body release and then change the speed to any higher speed. Be sure that curtain doesn't open while making this change. Also use a cable release when checking "B". Unscrew cap of exposure button and screw cable release in, in place of cap.

NOTE: T. B. I. #1 Cable release is used.

Special check on the retard speeds and on "B" is to be made as follows:

Actuate the shutter on 1/25 several times and then recheck the shutter on "B". Repeat this on each of the retard speeds. While doing this, watch the curtain for sluggishness, sticking open, and for having erratic speeds.

Operating the Self-Timer: Push the self-timer lever on top of camera, forward, as far as it will go (after shutter is wound). Press the exposure button, giving just enough pressure to start the self-timer lever. Do not use on "B". Check the delayed action on one second, 1/10, 1/25, 1/1000. The delayed action lever should set smoothly and hold when set. The lever should not protrude beyond edge of camera. The exposure button should not trip the shutter when the lever is set for delayed action. The delayed action should operate for a period of from 8 to 15 seconds.

Conditions to watch for while making the above shutter tests:

It should never take more than two complete strokes of the winding lever to set the shutter - 6 lbs. is the maximum pull required to set shutter on 1/25 second with 36 exposure film. Winding lever must not trip shutter. Winding lever must return to position after each stroke. Exposure button should not operate shutter before the shutter has been completely wound. Shutter signal shows red when shutter has been released - red is not visible when shutter is wound. Curtain must not open or become wrinkled while winding, especially on 1/1000 or while changing speeds. With exposure button in the lock position and finger pressure being applied to button, it should be impossible to release the shutter. The exposure button must not stick down. The setting action of high speed dial must not be rough nor have a binding action. High speed dial must line up with index, especially on 1/250, 1/500, and 1/1000. High speed dial must not turn beyond 1/1000. Retard dial must not move off 0 when shutter is actuated on 1/25, nor must it move too freely. The dial is to move with resistance.

Check shutter speeds on the electronic shutter checker and record in the table provided. The following tolerances are to be used:

SPEED SETTING	ALLOWABLE VARIATION IN PERCENT	IN FLASHES
1	-20 to +15	800 to 1150
1/2	-20 to +15	400 to 575
1/5	-10 to +50	180 to 300
1/10	-10 to +60	90 to 160
1/25	-30 to -25	28 to 30
1/50	-15 to 0	17 to 20
1/100	-20 to 0	8 to 10
1/250 (on 1/200 setting)	-30 to -20	3.5 to 4
1/500 (on 1/400 setting)	-10 to + 5	2.25 to 2.625
1/1000	+20 to +40	1.2 to 1.9

NOTE: The first setting on 1/1000 read very slowly. This should not repeat the second time. Shutter is to function at 0°F. The following illumination is to be made.

Make the following exposures while holding lens to illuminator:

4 set on 1/1000 at f/4
3 set on 1/500 at f/5.6
3 set on 1/250 at f/8
3 set on 1/100 at f/11
2 set on 1/50 at f/16
2 set on 1/25 at f/22

EASTMAN KODAK COMPANY

CAMERA WORKS

Rochester 4, N. Y.

September 16, 1944

Mr. Spry:

The following Ektra Shutter speed tolerances are the same as those used previously when the cameras were being made in Mr. Beal's Department.

Camera Setting Seconds	Shutter Machine Setting	Tolerance Percentage
1	1	-20 to + 15
1/2	1/2	-20 to + 15
1/5	1/5	-10 to + 50
1/10	1/10	-10 to + 60
1/25	1/25	-30 to - 25
1/50	1/50	-15 to 0
1/100	1/100	-20 to 0
1/250	1/200	-30 to - 20
1/500	1/400	-10 to + 5
1/1000	1/1000	+20 to + 40

We will continue to use these tolerances until such time that the Engineering Department should issue new ones.

Ralph W. Feil (signed)
Final Inspection Department

RWF:
Copy to Mr. Edgett
Mr. Kent
Mr. Eidman

CHECK THE FOLLOWING ITEMS ON EACH CAMERA.

1- 1/25 speed
2- 1/1000 speed
3- 1 second shutter speed in all positions
4- B., on extreme end.
5- B., on left side of line
6- B on line., second curtain should not close too slow.
7- D.A. for speed and releasing shutter.
8- D.A. trips in locked position
9- Exposure counter.
10- Counter operating lever for bind.
11- Curtain opens setting speeds from 1/25 to 1/1000.
12 Cleaned
13 Touched up.
14 Serial numbers.
15 Check all items against factory ticket
16 Graph. and shutter speed settings

OPERATION- Inspection Comolete - Appearance PART Kodak Extra

TOOLS DATE

STEPS	KEY POINTS	REASONS
Appearance	Black leather - creasing - anchorage Brush and polish chrome - free from mars, scratches and chips.	
Outside	Range Finder Housing - tight to case- satin chrome. Shutter Release Plunger - polished chrome- button knurled on edge. Retard Speed Dial - polished chrome - 25 to 100 in black - B, 1, 2, 5, 10, in red- knurled edge. High Speed Dial - plastic cover - B to 10 in red, 25, 50, 100, 500, and 1000 in black- red in dicator dot. High Speed Knob - polished chrome - knurled edge. Delayed Action Lever - polished chrome- knurled knob - does not extend beyond back edge of camera. Exposure Counter - polished chrome - black directional arrow - zero in red - 5 to 35 in black - knurled edge on knob. Lens and Finder Co-ordinating Control - knurled edge - polished chrome - figures in black - 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 153, 254. Range Finder Individual Vision Adjustment Dial- knurled edge- polished chrome - figures in black- 0, 1, 2, 3, 3, 2, 1, in red. Universal accessory bracket - brush chrome - flush with edge of housing - screws free from burrs. View Finder Focusing Collar - black knurled center - outside ring knurled polished chrome Magazine back cover lock - brushed chrome - turn to lock - black lettering - knurled ridge in center. Film movement indicator - polished chrome- red pluse. Film Type Indicator - Plus X, Super XX, Panatomic X, Micro File, Infra Red, Direct Positive, Daylight Type A Kodachrome - black lettering on nickel Winding Handle- Polished chrome - knurled knob. Magazine back exposure record - polished chrome mount - zero in red - 5 to 35 in black or nickel. Sliding lock Panel- polished chrome - lock and unlock engraved in black. Sliding Lock - brush chrome - raised knurled ridge across center.	

OPERATION - Inspection Complete - Appearance PART - Kodak Extra

TOOLS DATE

Sheet #2

STEPS	KEY POINTS	REASONS
Outside (cont'd.)	Rapid Rewind Crank - brush chrome - black arrow - knurled knob. Name Plate - made in United States of America by Eastman Kodak Co., Rochester, N.Y.- on nickel. Tripod Socket - polish chrome - serial number on back - knurling on front. Lens Locking Knob - knurled polished chrome knob - brush chrome arm. Focusing Knob - black leather center - knurled polished chrome ring. Lens barrel Retainer - brush chrome- four screws free from burrs. Magazine back locking nut - polished chrome- knurled edges - brush chrome supports. Neck strap lugs - brush chrome.	
Inside Open Mag. Back	Case - dull black - clean - no mars. Pressure Pad - highly polished chrome- no scratches, digs or dirt. Locking Bar - dull nickel- screws free from burrs. Film de-clutching lever and screw - nickel, no burrs. Film track - smooth and polished. Aperture - square corners - clean.	
Remove Magazine	Case - glossy black - free from mars and scratches. Automatic Dark Slide - dull black - no mars, clean - straight leading edge Felt Light Guard - anchorage - clean edges. Four Magazine seats- smooth - no digs. Locking screws - clean threads. Rivets - flush with case - well turned. Screws - free from burrs. Key - no burrs. Film Advancing Gears - free from burrs and chips. Serial Plate - brush chrome - screws free from burrs.	
Check Camera	Case - dull black - glossy black curtain cover guard. Shutter curtain - free from wrinkles. Aperture - square corners - clean edges. Four Magazine seats - smooth - no digs. Locking nuts - clean - rivets well turned. Keyway and Gears - free from burrs and chips. Screws free from burrs. Rivets - flush with case - well turned.	

OPERATION - Inspection Complete - Appearance

PART - Kodak Ektra

TOOLS

Date

Sheet #3

STEPS	KEY POINTS	REASONS
Replace Magazine	Both shutter and film winding mechanism must be wound before replacing magazine.	

OPERATION - Illumination and Film Wind

PART - Kodak Extra

DATE

STEPS	KEY POINTS	REASONS
Open Back	No bind or catching - lock moves with resistance.	
Load Camera with 18 Exposure Roll	Cassette must not bind on supply spool web. Film must have a positive anchorage in the takeup spool. Sprocket teeth must engage film perforations.	
Close and Lock Magazine Back	No bind or catching.	
Attach 50 MM Lens	Must lock securely.	
Film Wind and Illumination	Wind to 1st exposure - Pulse must vibrate. Set counter - must not turn backwards. Wind the film - making the following exposures while holding the lens to illuminator: 4 set on 1/1000 at f/4 3 set on 1/500 at f/5.6 3 set on 1/250 at f/8 3 set on 1/100 at f/11 2 set on 1/50 at f/16 2 set on 1/25 at f/22 Check for the following while making the above: Pulse must vibrate Counter must advance with each exposure. Not more than two complete strokes to set shutter and advance film. Winding lever must not trip shutter Winding lever must return to position after each stroke. Shutter release plunger must not operate shutter before shutter has been completely wound. Shutter release button must not stick down. Shutter signal - shows red when shutter has been released - red signal is not visible when shutter is wound.	
Rewind Film	Crank - no bind when being raised or lowered. Rewind - no bind - smoothly but with resistance.	
Remove Film	Cassette must not bind on supply spool web. Advance sprockets - no piling up of film emulsion.	
	Have film developed while inspecting the remainder of camera.	

OPERATION - Shutter Inspection

PART - Kodak Ektra

DATE

STEPS	KEY POINTS	REASONS
Remove Lens		
Place Mirror in Front of Camera	Be able to see shutter curtains in mirror during the following:	
Actuation	Twice across and twice back on each speed- Curtain must not stick open on any speed including "B" Actuate the shutter on 1/25 several times and then re-check on each of the retard speeds- must not be erratic High speed dial must line up with indicator on each speed - must not turn beyond 1/1000. Use delayed action on 1/10, 1/25 and 1/1000- 8 to 15 seconds duration - hold when set - shutter release plunger must not trip shutter. T.B.I. cable release is used - try on 1/25, 1/100 and 1/1000 - free action. Shutter release plunger lock - shutter must not operate with plunger locked.	
Shutter Speeds	Use Electronic machine.	
Turn on Electronic Machine	Test machine warm up for 10 minutes.	
Remove Magazine from Camera	Use winding stick to wind shutter.	
Set Speed Indicator On "S" Place camera on Mount-lens opening to right	1. Set "Speed Control" knob on "Check" position and "Test- Reset" key on the horizontal or "Test" position. 2. Turn "On - Off" switch to "On" position. 3. Adjust "Total open Time" meter and "Equivalent exposure" meter to "100" point on scale with "Total Time Adj." and "Equiv. exp. adj."knobs respectively. 4. Turn "Volmeter" switch to "check" position- open shutter - adjust "Gain" knob to bring "Equiv Exp" meter to Green mark on dial- return "Volmeter" switch to "Test" position.	

OPERATION - Shutter Inspection

PART - Kodak Ektra

Date

STEPS	KEY POINTS	REASONS
Set speed indicator on "S" Place Camera on mount-lens opening to right (cont'd)	5. Close shutter - set "speed control" knob to desired speed - set shutter on desired speed press "Test-Reset" replace same, and immediately trip shutter. Note readings on meters as soon as possible after meter stabilizes. Readings may be repeated by merely raising "Test-Reset" key to "reset Lock" position - winding shutter - releasing "Test Reset" key and then trying shutter. 6. The "Test Reset" key must only be left in the "Reset-Lock" position only long enough to change speeds on camera. 7. To test on 1/1000 second speed setting- turn "Total time "on off" switch to "off position. Read "Equiv. exp" meter only. Return switch to "on" position before reading any other speeds.	
Check Shutter Speeds on 1, 1/2, 1/5, 1/10, 1/25 ,1/500 and 1/1000	Check each speed three times.	

Tolerance

SPEED SETTING	ALLOWABLE VARIATION IN PERCENT	ALLOWABLE VARIATION IN FLASHES
1	-20 to +15	800 to 1150
1/2	-20 to +15	400 to 575
1/5	-10 to +50	180 to 300
1/10	-10 to +60	90 to 160
1/25	-30 to -25	28 to 30
1/50	-15 to 0	17 to 20
1/100	-20 to 0	8 to 10
1/250 (on 1/200 setting)	-30 to -20	3.5 to 1
1/500 (on 1/400 setting)	-10 to + 5	2.25 to 2.62
1/1000	+20 to +40	1.2 to 1.9

Remove Camera from fixture. Replace Magazine and Lens on Camera

Record rejected speeds.
Shutter must be wound before replacing magazine.

OPERATION - View and Range Finder Inspection

PART - Kodak Extra

DATE

STEPS	KEY POINTS	REASONS
Remove Magazine	Magazine must not come off if slide lock is not in unlock position.	Film aperture m be covered by d slide.
Place in fixture	Locking nuts must be tight Hook added lens on to focusing collar.	
Set lens and finder co-ordinating control on 50	All four lines on chart marked 50mm - Inf. must come in with lens set on infinity. All four lines on chart marked 50mm- 3½' must come in with lens set on 3½'	To insure margin of safet
Set Lens and Finder Co-ordinating Control on 153	Adjust View Finder Focusing Oculor All four lines on chart marked 153 mm- Inf. must come in with lens set on infinity.	
Replace Magazine change lens and finder co-ordinating control to 50		
Range Finder Check	Use master cam- Set scale on desired distance Walk target back or forth until image is in coincidence. Check coincidence from both ends of scale Divide line sharp - Image clean - no interference from dirt. Upper and lower fields match for clarity.	
Tolerance		

II Mechanical and appearance

A. Camera

Wind the shutter and film mechanism with the winding lever. Lock the exposure. Move the slide on the bottom of camera to "closed" and loosen the two screws on each side of the front of the camera. Then lift off the magazine back.

NOTE: It should be impossible to remove magazine if slide is not completely over to "closed". Shutter must be wound completely before magazine can be returned to camera. Inspect the camera as follows:

1. The Range Finder diopter scale, the finder lens co-ordinating control, and the View Finder focusing ocular are to turn with resistance. Lettering is to be clear and uniform.

2. Shutter aperture - straight edges - clean, especially at the corners.
3. Metal curtain cover guard - smooth - no mars or scratches - tight fit.
4. Precision abutments - smooth, bare metal, no pitts - clean.
5. Locking nuts - must have play - threads must be clean.
6. Screws and rivets - no burrs - well turned.
7. Unlock exposure button - trip shutter - wind shutter using winding stick. Note condition of curtain while being wound. Edges straight - no buckle.
8. Tripod nut - tight to camera - try gauge in threads.
9. Range and View Finder windows must be securely fastened to case.
10. Neck strap lugs - must move freely - a slight side play.
11. Check main drive for no play.

B. Magazine

1. Sliding lock - operate freely and smoothly - a positive lock - try pulling slide to "open" without depressing button in center of sliding lock - automatic dark slide completely open or closed as indicated by slide lock - no buckle - rivets in lead edge of slide must be well turned, smooth, and flush with surface of slide. Max. force to move the slide lock is 60 ozs.
2. Light leak protection (felt) around aperture.-tight to metal - does not protrude into aperture - even - light leak dope in cracks.
3. Key - no burrs - cannot be turned in either direction when slide lock is in the closed position with shutter wound and rewind handle down. Note: Use care-do not force. Slight play allowed. Serial number plate - tight and smooth.
4. Coupling gears - no play - teeth must not be damaged.
5. Precision abutments - smooth and clean - locking screws - threads clean - no burrs - tight - screws and touch-up - not burred and neat.

B. Magazine (continued)

6. Hinge pin - pulls out with slight tension - end formed to lay close to case - Does not change position as back is opened and closed.
7. Exposure record - action - smooth - slight tension.
8. Rapid rewind crank - recovery spring must be strong enough to hold crank tight to case - knob must turn freely.
9. Film type indicator - to have a slight resistance when turned - check lettering.
10. Give the magazine cover lock a half turn counter-clockwise and slide it to the left - it should not bind - open magazine cover - it should not bind on hinge - nor should the pressure pad strike on the declutching lever.
11. The pressure pad should be smooth and free from dirt, scratches, and fingerprints.
12. The take-up spool must turn freely at all times - the teeth of the film sprockets must not be damaged - the declutching lever must not bind when rewind crank is raised and lowered. No play allowed. The max. torque to rewind clutch is 14 ounce inches.
13. The shutter aperture must be square, clean, and have one notch in lower edge of back frame - key web for film cassette must have slight in and out play.
14. Check the forming of the lens backing lever and height. The height of lever to lens seat should be .395 min. when lever is in an outward position and should be .368 max. when depressed. With a 36 expsoure roll of film in the recess on the right....first engaging the two prongs in the camera into the opening of the cassette having the cross piece, draw the film across the film track and insert the end of the film into the slot of the take-up reel and engage the second film perforation with the lug in the slot.

The filmmust have a positive anchorage in the take-up spool revolve the take-up reel by the knurled flange to bind the film on the reel, and make certain that the sprocket teeth engage the perforations. Close and lock the magazine and then turn the exposure counter, in the direction of the arrow, to the first line after the zero - counter should not turn backwards. Wind through the 36 exposures roll, noticing the follwing:

1. Film advance - watch pulse - it must be possible to see the pulse vibrating. If it does not vibrate, open back to see if film is properly threaded - counteraction must move to next exposure number every time a new section of film is brought into.
2. Film should not advance if the slide lock is off the "open" position. Recheck shutter points and winding lever action as mentioned under "C-5" - film must advance for a t least 36 exposures.
3. Film rewind - rewind crank must not bind when being raised or lowered. Section of rewinding must not be rough - open back - check perforations for tearing - remove film and check magazine film tracks, by advancing sprocket, for film emulsion piling up - check film for being scratched.

IV
1. Check interchangeability of camera and magazine to gauge #_____ and #_____ respectively.
2. The distance from lens seat to the pressure pad is to be 1.123 ±.001. Use gauge #_____.

V Lens Check

1. Diaphragm control ring should move smoothly with slight resistance.
2. The focusing ring should have a smooth action - no in or out movement.
3. The pull pin, for allowing the focusing ring to be turned to the short distances, should operate freely and should snap in when released.
4. Hold camera with lens pointing down - apply slight finger pressure.
   Front element of lens must be tight - no up and down play.
5. Lens lock must hold lens tight - place fingers around lens locking ring - apply a turning pressure - lock must hold lens from turning.
6. Remove lens from camera as follows: First, press the lens lock toward the camera body and give the lower knurled collar a half turn, counter-clockwise, Then, release the lock and continue unscrewing the lens, Place the camera on the bench, finish checking the lens as follows.
7. Hold lens front up. Apply slight finger pressure - no up and down play. Rear element of lens must be tight.
8. Hold lens to light - there should be no dirt, chips, or cement starts in the various lens elements.
9. While holding the lens to the light, operate the diaphragm. Blades must not bind - openings must not become irregular, especially at f/22 - lock through in both directions.

VI View Finder Check

To check the View Finder, take lens from box and attach to camera by fitting the wide slot in the bottom rim of the lens barrel over the wide key in the lens opening of the camera and then screwing the lens in place by means of the lower knurled collar. Set lens at 5' - insert T. B. I. #1 cable release - open shutter on "T" - place camera on fixture for checking the margin of safety and parallax of view finder. The margin of safety is to be 10% at 10 ft. and 5% at 3 1/2 ft.

1. Adjust camera to line-up chart in view finder - open back of magazine - place ground glass with a margin around the four sides.
2. Repeat the above check, using the various lenses - set the lens and finder co-ordinating control to correspond with the lens being used - use focusing ocular to focus finder for each lens used.
3. While making these checks - check the finder for dirt - for distortion. Lines on chart must appear straight

VI View Finder Check (continued)

3. In finder for cut off parallax. Compensating lens frame must be square and in line with view finder window frame.

4. Remove ground glass - close back - release shutter - remove cable release - remove camera from fixture.

5. (a) With master lens gauge #_____ check the range of the range finder to the following tolerances:

(b) Prior to shipping the lens and camera are to be checked for range of the range finder to the above tolerances.

VII A copy of the Inspection Data Sheet and the Photographic Testing Department report is to be filed in Mr. Bush's office at the time of shipping.